

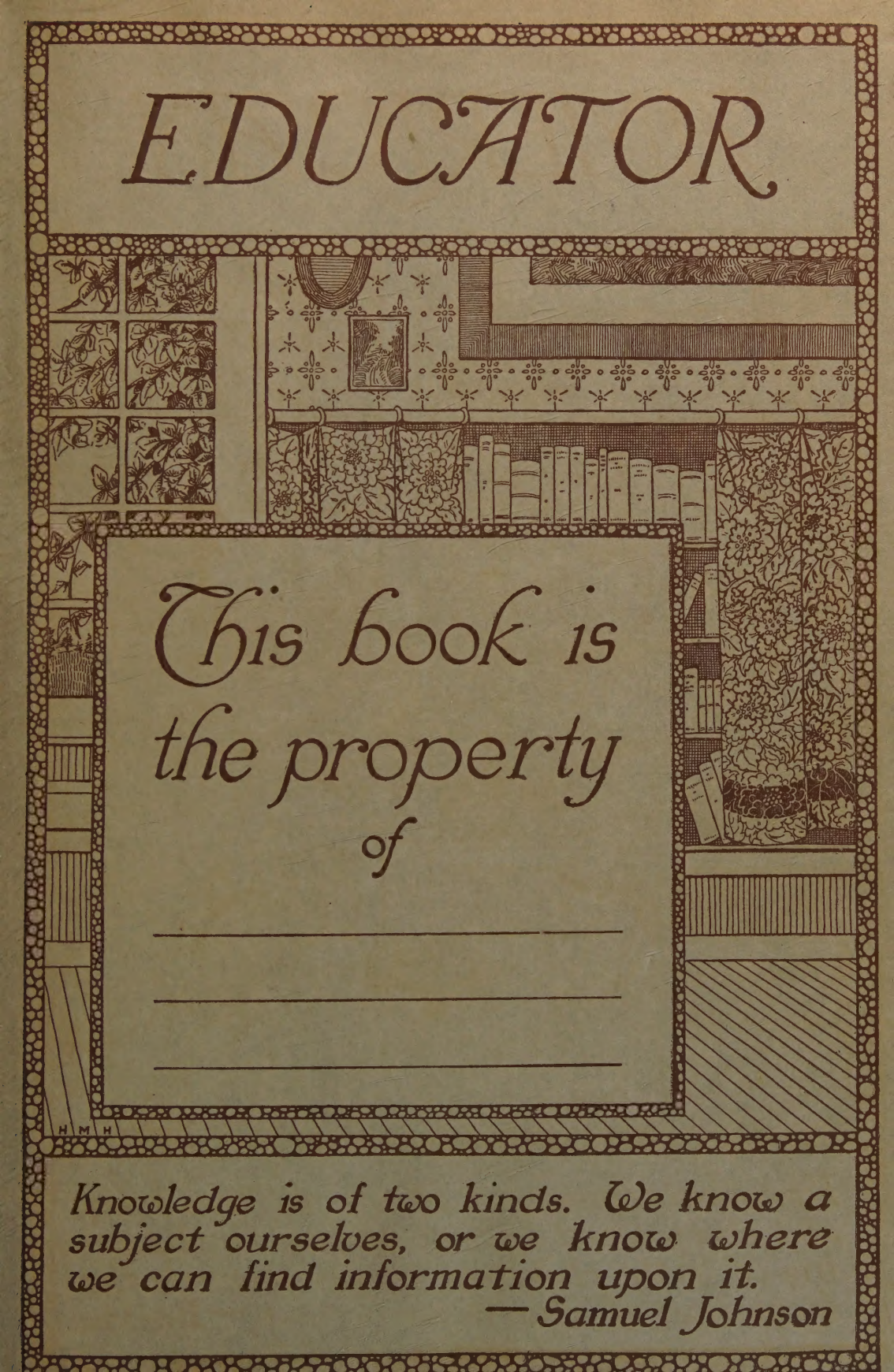
AMERICAN



*Education commences at the mother's knee,
and every word spoken within the hear-
ing of little children tends towards the
formation of character.*

—Ballou

EDUCATOR

The page is framed by a wide, ornate border composed of repeating circular and floral motifs. The background features a detailed illustration of a library or study. On the left, a window is divided into six panes, each showing a different floral or leaf pattern. To the right of the window, a bookshelf is filled with numerous books of varying heights. A small, framed picture hangs on the wall above the books. The floor is depicted with a simple line pattern. The central text is enclosed in a rectangular frame with a decorative border.

*This book is
the property
of*

*Knowledge is of two kinds. We know a
subject ourselves, or we know where
we can find information upon it.*
— Samuel Johnson

THE AMERICAN EDUCATOR,

*A New and Thoroughly Modern Reference Work Designed
to Meet the Needs of Every Age*

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Extension Edition

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VOLUME SEVEN

RIDPATH, JOHN CLARK (1841-1900), an educator and historian, born in Putnam County, Ind., and educated at De Pauw University. He was for a time professor of languages in Baker University, Baldwin, Kan., then professor of English and history in Asbury (now De Pauw) University, of which he became vice-president. He was largely instrumental in securing the endowment that placed this institution on its present footing and changed the name to De Pauw. Dr. Ridpath devoted the last years of his life to literary pursuits, and he was the author of a *Popular History of the United States*, a *Cyclopedia of Universal History*, *Life of James A. Garfield*, *Life and Times of Gladstone*, *Great Races of Mankind* and several other historical works.

RIEL, LOUIS (1844-1885), a Canadian agitator, was born at Saint Boniface, Man. Though generally known as a half-breed, his ancestry was mainly French. From 1866 to 1868 he worked at various occupations in Minnesota. In 1869 the transfer of the territorial rights of the Hudson's Bay Company to the Dominion government led to an armed revolt of the half-breeds under Riel's leadership. In October a party under Riel turned back the new governor (Hon. Wm. McDougall) and later captured Fort Garry (Winnipeg). After holding a convention which passed a bill of rights, a provisional government with Riel as president was formed. So far the metis or half-breeds were within their rights, but the execution of Thomas Scott, an Orangeman from Ontario, roused the whole of English-speaking Canada against them. An expedition under Colonel Wolseley captured Fort Garry, but Riel escaped. He was not arrested or prosecuted, and several years later was elected to the House of Commons, from which he was expelled after a year. He was again elected in 1874, but his seat again became vacant after he was outlawed in February, 1875. For nine years he kept out of public notice, spending five years in Montana. In 1884 in response to a call from his countrymen, who had moved west to the Saskatchewan district, he returned to Canada. His own rashness and the harshness of the offi-

cials caused another rising, known as the Saskatchewan Rebellion, which was crushed after hard fighting. Riel was imprisoned at Regina, was tried and found guilty of treason, and was executed in November, 1885.

RIENZI, re en'ze, COLA DI (about 1313-1354), a popular leader of Rome, in which city he was born and educated. Aroused by the oppression of the people under the nobles, he instigated a popular rising, assuming the title of consul of orphans, widows and the poor. For three years he harangued the people and menaced the nobles, who, thinking him mad, made no effort to suppress him. At last, in 1347, in the absence of the governor of Rome, he assembled his friends upon Mount Aventine, delivered a fiery discourse, and induced them all to subscribe to an oath for the establishment of a republican government. The people conferred upon him the title of tribune, with all the attributes of sovereignty. He banished several noble families and compelled those who remained to do him homage. In overriding the Pope and imposing heavy taxes he lost his hold on the people and was forced to leave Rome. He attempted, two years later, to gain the support of Emperor Charles IV in his attempt to reconquer Rome, but the emperor imprisoned him and handed him over to Pope Clement at Avignon. Innocent VI released Rienzi and sent him to Rome to oppose another popular demagogue, and the people received him enthusiastically, but after a turbulent administration of a few months he was killed. Bulwer-Lytton made Rienzi the hero of a novel, and Wagner based an opera on him.

RIESENGEBIRGE, re'zen ge beer'geh, a mountain range of Europe, separating Silesia from Bohemia and forming a part of the Sudetic Mountains. It contains the loftiest mountains of the central part of Germany. One of the most famous peaks is Schneekoppe, 5,265 feet high.

RIFLE, ri'fl, a firearm having spiral grooves in the interior of the barrel. The rifle is one of the principal weapons of modern armies. Its great advantage over the musket lies in the spiral grooves in the barrel, since these impart a rotary motion to the

bullet that keeps it in its direct path. The number and depth of these spiral channels varies in different rifles, the most approved form having the grooves and ridges of equal width and the spiral turning more sharply as it nears the muzzle.

The bullet fired is now always of an elongated form. The great advantage gained by a weapon of this construction is that the bullet, having a rotary action, is preserved in its direct path, without being subject to the aberrations that injure precision of aim in firing with unrifled arms.

Rifles were invented in Germany in 1498 and have been used as military weapons since 1631. In 1851 the first rifle firing in elongated bullet appeared, under the name of the Minié. It was succeeded in 1853 by the Enfield rifle. Next came the breech-loading rifle. In this rifle the breech is closed by a block, which contains a piston, or striker, the latter exploding the cartridge by the force of a strong spiral spring passing round it.

The repeating rifle is a development of a very old type of weapon. In the Spencer, the first used with signal success, the cartridges are in the stock of the arm; in the Winchester, the best known of repeating rifles, they are in a tube underneath the barrel. More modern military magazine rifles draw their supply of cartridges from a reserve, contained in a detachable magazine, the advantage being the greater efficiency of the weapon as a single loader. The automatic rifle is the magazine rifle's successor.

In 1918 the Browning automatic or machine rifle was adopted by the United States army. It is a gas-operated water-cooled gun, weighing about fifteen pounds, and it can be operated from the shoulder or the hip. The pressure of the gas that expels the bullet may be as high as 50,000 pounds to the square inch. A portion of the gas is used in operating the gun, so that it can be fired continuously. The magazine holds forty cartridges, and it is possible to fire over forty shots a minute. On leaving the muzzle the bullet travels at a rate of 2,300 feet per second, and accurate shooting may be done at a range of a mile or more. The penetrating power of the bullet is astonishing. It will go nearly four feet into the solid earth; will penetrate five feet of soft wood or $\frac{1}{2}$ inches of hardened steel. If a half dozen men were standing one behind another, the bullet would pass through all of them.

The ordinary sporting rifles have been equipped with the improvements that were used in military arms, but as the purpose of the sporting rifle is different, all improvements have been modified and some new ones made. For instance, the sights have been so arranged as to aid the amateur, the stocks have been omitted and the weight of the rifle has been lessened, until it can be handled with moderate ease. Improvement in the ammunition for the sporting rifle has added as much to its efficiency as the improvements in the gun itself.

The World War lent a great impetus to the manufacture of rifles and ammunition in the United States. From the beginning of the war until July, 1918, over 1,887,000 rifles were made in the country, and the manufacture of cartridges reached an average daily production of over 15,000,000.

RIGA, *re' gah*, LATVIA, a seaport and the capital of the country, which formerly was one of the provinces of the Russian Empire. Riga is situated on both banks of the Dūna, about ten miles above the mouth of the river, on the Gulf of Riga, an arm of the Baltic. The city is 363 miles southwest of Petrograd, and before the World War was second in importance only to the Russian capital among the Baltic ports, carrying on an extensive export trade in flax, hemp, timber, linseed, grain and eggs. It was also an important manufacturing center and supported numerous charitable and educational institutions.

The town was founded in 1201, and from an early period had a strong German element in the population. The oldest part of the city has the appearance of a medieval German town. Because of its proximity to Petrograd, Riga has frequently been an objective point in military operations. During the World War it was several times bombarded, and in 1917, after the collapse of Russia, it was captured by the Germans without resistance. The defeat of Germany a year later again changed the situation, but the city soon fell a prey to the Bolshevik army of Lenine. In the spring of 1919 Lettish troops, with the assistance of German forces, drove out the Bolsheviks. Population, 1920, 185,137.

RIGA, or **LIVONIA**, GULF OF, an arm of the Baltic, which washes the coasts of two nations, Latvia and Esthonia. It is 100 miles long and the greatest width is seventy miles. The entrance is almost closed by Oesel Island. The chief river flowing into it is the Dūna.

RIGGS, KATE DOUGLAS WIGGIN (1859-1923), one of the foremost of American story-writers, whose *Rebecca of Sunnybrook Farm* has been pronounced the best girls' story since *Little Women* was written. She was born in Philadelphia, and in 1877 went to live in California, establishing there the first three kindergartens for poor children on the Pacific coast. In 1895 she married George C. Riggs. She has received a high literary degree from Bowdoin College. Her sympathy with children and penetrating knowledge of child nature, gained through many years' experience as a trained kindergarten, have made three of her books, *The Training of Children*, *Children's Rights* and *The Republic of Childhood*, invaluable as teaching aids. She is an extremely prolific writer, and besides the many volumes of verse and stories she has arranged or written, some of them in collaboration with her sister Nora Archibald Smith, she has to her credit *Timothy's Quest*, *Penelope's Irish Experiences*, *The Story of Patsy*, *Susanna and Sue*, *The Birds' Christmas Carol*, *The Diary of a Goose Girl*, *Mother Carey's Chickens* and many others.

RIGHT OF WAY, the right of passing over land which is not one's own. Rights of this kind are public, if enjoyed by everybody; private, if enjoyed by a certain person or class of persons. Wherever there is a public right of way, there is a highway. A right of way is usually granted when one purchases a tract of land which is cut off from a public highway by land owned by another. If this land is owned by the one who sold the tract, a right of way is implied in the sale.

RIIS, JACOB AUGUSTUS (1849-1914), an American journalist, social worker and author, was born and educated at Ribe, Denmark. He emigrated to America at the age of twenty-one, and for six years engaged in manual labor. He then became a reporter on the *New York Tribune*, but soon joined the staff of the *Sun* as a police reporter. The work that made Riis so widely known was the outgrowth of his experience in this position. His sympathies for the poor and the unfortunate led him to urge improvements in police methods and the undertaking of measures for permanent relief of the congested district in lower New York. He was influential in securing better tenement houses and the establishment of playgrounds and

small parks. In 1897 he was secretary of the New York Small Parks Commission. His last years were devoted to writing and lecturing, and at the time of his death he was regarded as one of the most prominent social workers of his time. His most important publications are *How the Other Half Lives*, *Out of Mulberry Street*, a collection of fiction; *The Children of the Slums*, and *The Making of an American*. One of his later works, *Theodore Roosevelt*, *The Citizen*, has been widely read.



JACOB AUGUSTUS
RIIS

RILEY, JAMES WHITCOMB (1853-1916), the "Hoosier Poet" and most beloved American poet of his generation. Although much of his verse is written in Hoosier dialect, some of his finest outpourings are in purest English. The pathos and humor of his descriptions of scenes of simple life, his keen interpretation of child life and his kindly understanding of local character, have made him one of the most widely read of modern poets.



JAMES WHITCOMB
RILEY

Riley was born in Greenfield, Ind. After receiving a common school education he worked for a time as an itinerant sign painter, and later performed in a theatrical company. It was during his travels with this company that he became so intimately acquainted with the Indiana life which his poems reveal. His literary work began in 1875 with contributions to newspapers and magazines, which he wrote under the pen name of Benjamin F. Johnson, of Boone.

Among his volumes of verse are *The Old Swimmin' Hole* and *'Leven More Poems*, *Character Sketches and Poems*, *Afterwhiles*, *Green Fields and Running Brooks*, *A Child World*, *An Old Sweetheart of Mine*, *Rhymes of Childhood* and the *Book of Joyous Children*. An edition of his collected works also has been published.

RINDERPEST, or **CATTLE PLAGUE**, *playg*, an infectious disease which attacks cattle, and, sometimes, sheep. It is unknown in North America, but is generally prevalent in Europe, and Central Asia, where enormous losses have been caused by epidemics of rinderpest. About ninety per cent of the animals attacked die, but if an animal survives it is thenceforth immune. The disease is conveyed from one country to another by means of cattle afflicted with it or through infected hides, wool and food. It may also be carried in the manure of sick animals, and by attendants. The cause of the disease is a minute organism or microbe (see **BACTERIA AND BACTERIOLOGY**), which is so small that it is very difficult to discover, though experiment has proved that it is withheld by the finest of bacterial filters.

The first sign of the disease is a high fever and a rapid pulse. As the disease progresses the respiratory and digestive organs are strongly affected. There is congestion of the mucous membrane of the mouth and throat, and ulcers are formed. In severe cases death ensues in from four to seven days. No remedy for the disease has been found, but epidemics may be held in check by inoculating healthy animals with a serum prepared for this purpose. All afflicted animals should be killed at once and their carcasses be disposed of in the shortest possible time.

RINEHART, *rine'hart*, **MARY ROBERTS** (1876-), one of the most popular of present-day American novelists, was born in Pittsburgh, Pa. After high-school graduation, she entered training as a nurse, and many of her subsequent short stories are founded upon her observations within hospital walls. In 1896 she married Dr. Stanley Marshall Rinehart. During the World War she enlisted in the American Red Cross, serving for a year in France and Belgium, and two of her latest books, *The Amazing Interlude* and *Hospital Love Stories*, are founded upon her personal experiences and impressions there. Other popular stories include *The Circular Staircase*, *Amazing Adventures of Letitia Carberry*, *Where There's a Will*, *The Street of Seven Stars*, *K, Tish, Bab-A, Sub-Deb* and *Dangerous Days*. Several of her books have been dramatized for the moving-picture stage. Particularly pleasing were the film presentations of the *Sub-Deb* stories, which were featured by that petite artist, Marguerite Clark. The *Letitia Carberry*

sketches have also been put on the films, featuring the competent "Tish." In 1921 she published *Sight Unseen and the Confession*, *A Poor Wise Man*, *The Truce of God*, *Affinities* and *Other Stories* and *More Tish*.

RING, an ornament of gold or other metal, worn on the finger, a custom which dates back to the beginnings of human history. The form worn in early times was the signet ring, which was used as an emblem of authority and was a sign of confidence and favor. Rings were also worn as ornaments, and the Hebrews and Persians employed precious stones in setting them.

The use of betrothal and wedding rings originated with the Jews. The wedding ring is worn on the left hand, to denote a wife's subjection to her husband, and on the third finger because from it a vein is sentimentally supposed to go direct to the heart. The ring appears from an early period to have been an important feature in the coronation of kings and in the consecration of bishops, a practice which is yet continued.

Many uncivilized people wear rings to adorn the nose, ears, arms and toes. Rings also have been worn as talismans and as charms against evil. Before the invention of coinage, rings were used as money, and even to-day copper rings are common among African traders.

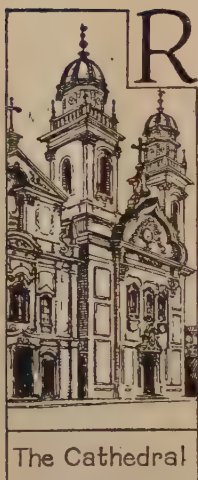
The ring of the Pope has an interesting significance. Upon coronation the Pope is presented with a ring by the city of Rome, which bears his name and a picture of Saint Peter in a boat. He subsequently signs each official decree with this signet. Upon his death his ring is broken, and a new one is made for his successor. It is customary for the Popes to present large thumb rings to newly-appointed cardinals.

RINGWORM, a skin disease, so called because it spreads in rings. It is caused by a minute fungus, or vegetable mold, and usually occurs on the scalp or face. When on the scalp, it causes the hair to break off, loosen and fall out; if on the face, it causes soreness. Wherever it occurs, ringworm subjects the patient to the annoyance of constant itching. When the disease appears a physician should be consulted, for it will continue to spread until the fungus is killed. Ointments containing mercury or sulphur are usually effective. But, before applying them, the affected places should be shaved and the roots of the dead hairs should be pulled out.



RIO DE JANEIRO, BRAZIL

View of the water front and the harbor dotted with islands, one of which is the Sugar Loaf
Improvements such as are here shown extend for several miles along the harbor, and were built at a cost of \$17,000,000
Further extensions are contemplated



RIO DE JANEIRO, *re' o da zha na'ro*, BRAZIL, the city on the "most magnificent harbor in the world," is the capital of the republic and the second largest city of South America. It is situated on the west side of the Bay of Rio de Janeiro, 5,204 miles from London, 4,748 miles from New York and 5,160 miles from New Orleans. The bay is surrounded by mountains whose sides are covered with verdure, and this setting gives the city a remarkably picturesque site. The city extends along the bay for about fifteen miles, and a number of spurs of the mountains enter within its limits. Like most Spanish cities, it contains a number of squares, or plazas, around which the important buildings are grouped. The chief of these is surrounded by the city hall, the Senate house, the mint and other public buildings, and it is near the imperial palace formerly occupied by the emperor. In the older part of the town the streets are narrow and irregular. This is the commercial section and contains the most important buildings, such as the customhouse, the postoffice, the exchange, the Hospital of Santa Casa da Misericordia, the National Academy of Fine

schools, the Hydrographic Institute, historical and geographical societies, the national library, with over 300,000 volumes and many manuscripts, numerous schools of medicine and surgery and a national conservatory of music. Since the latter part of the nineteenth century, Rio de Janeiro has been transformed from a typical South American city, closely resembling the towns of the Old World, into a modern American city with all up-to-date conveniences. The streets are broad and well-paved; a boulevard has been constructed along the bay at an expense of \$17,000,000; the entrance to the harbor has been deepened so that the largest ships now anchor at the numerous piers; magnificent public buildings have been erected, and Sugar Loaf, one of the mountains at the entrance of the bay, has been connected with the city by an aerial trolley.

Rio de Janeiro is one of the chief commercial ports of South America and is noted for its shipments of coffee, which exceed those of any other city. It has regular steamship communication with the leading ports of the United States and Europe. It is also connected by railway with surrounding towns and the rich agricultural districts in its immediate vicinity. The manufactures are comparatively unimportant. Chief among them are textiles and flour and grist mill products; these are consumed largely at home.

The place was first settled by the French in 1555, but two years later they were dispossessed by the Portuguese, who in 1567 founded the city. In 1640 it was captured by the Dutch, and about 1750 it became the capital of Brazil. From 1808 to 1821 it was the residence of the king of Portugal. Population, 1,157,873 (census, September, 1920).

RIO DE LA PLATA, *plah'tah*, an estuary formed by the Parana and Uruguay rivers in South America, is really a broad arm of the sea extending inland between Argentina and Uruguay for more than 200 miles. It is 143 miles wide at its mouth and discharges a volume of water next to that of the Amazon. The rivers bring down large quantities of silt, and the estuary is gradually filling up. It has a strong current, and shoals and narrows are constantly forming, making navigation difficult and dangerous. The best harbors are those at Montevideo, Buenos Aires and La Plata. The estuary was discovered by Diaz de Solis in 1516, and given its name, which means *silver river*, by Sebastian Cabot.



Arts, the museum and the polytechnic institute. The public arsenal and theaters are also in this section. The leading educational institutions include the military and naval

RIO GRANDE, *ré'o grahn'da*, a river famed in two countries, forming the boundary between Texas and Mexico. It rises in the southwestern part of Colorado, flows southward through New Mexico, then southeastward, and empties into the Gulf of Mexico, near Brownsville, Tex. It is about 2,000 miles long, and it is navigable for small boats in the rainy season for 250 miles. Along its middle course much of its water is used for irrigation, and during the summer portions of its bed may be dry. The valley of the Rio Grande has been the scene of numerous disturbances between Mexico and the United States.

RIO NEGRO, *ré'o na'gro*, a river of South America, the largest tributary of the Amazon from the north, rises in the southeastern part of Colombia, flows south into Brazil, then southeast, and joins the Amazon about fifty miles above the Madeira. The main river is formed by the union of the Guainia and the Uaupes; some geographers consider one of these streams, and some the other, to be the source of the river. The Rio Negro is navigable for ocean ships to Manaos, a thriving city ten miles above its mouth. Its entire length is 1,400 miles.

RIOT. By the common law a riot is an unlawful assembly of three or more persons, which has actually begun to execute the purpose for which it assembled, by a breach of the peace and to the terror of the public. A lawful assembly may become a riot if the persons assembled form and proceed to execute an unlawful purpose, to the terror of the people, although they had no such purpose when they assembled. The penalty for those convicted of engaging in a riot is fixed by the statutes of the different states. If the rioting leads to loss of life, the penalty is more severe than when it results in the destruction of property only. Those who incite others to riot are held to be equally guilty with those who actually engage in creating the disturbance, even though they may be absent.

RIPARIAN RIGHTS. The owner of land bordering on a stream that is not navigable owns that portion of the bed of the stream that borders his land as far as its middle. He also has the right to a reasonable use of the water. However, he cannot use all the water, neither can he pollute the water, nor change the course of the stream, if by so doing he will interfere with like rights of those living farther down the stream. These lawful privi-

leges are known as *riparian rights*. The term comes from the Latin word *ripa*, meaning *river bank*.

RIP VAN WINKLE, the hero of Washington Irving's delightful sketch by the same name. He is an idle, good-natured, hen-pecked scapegrace, who neglects his patch of maize and potatoes in a small village near the Hudson River, and, with his gun and dog Wolf, his companion in idleness, seeks a refuge from the scolding tongue of his sorely-tried but termagant wife in the forests of the Catskill Mountains. There he falls in with Hendrick Hudson and his crew of the *Half Moon*, who are playing at ninepins in a secluded hollow, the balls as they roll echoing along the mountains like rumbling peals of thunder. Rip is told to serve them, and while doing so he tastes again and again of the liquor he hands, till his senses forsake him.

He awakens on a bright summer morning to find his dog gone, a rusty firelock by his side, and his beard a foot long. When he returns to the village, he finds new buildings, new names on the shops, new faces at the windows. His own house is fallen into decay, his wife is dead. His sleep, he discovers, has lasted twenty years, and meantime the American Revolution has passed and left all things changed. Rip, however, is recognized by some of his old cronies, finds a home at his daughter's house, and for many more years is as comfortable at the door of the new wooden Union Hotel as ever he was at old Nicholas Vedder's quiet Dutch inn.

The story has been often dramatized, but no version has long held the stage except Boucicault's, with which the name of Joseph Jefferson is identified.

RISTORI, *re sto're*, ADELAIDE (1822-1906), a famous Italian tragic actress, the daughter of strolling players. She made her début when very young, won favor, especially, as Francesca da Rimini, and before she was twenty was recognized as the foremost Italian actress of her time. In 1846 she was married to Marquis Capranica del Grillo, and she withdrew from the stage for two years. For a time, during the French siege of Rome, she served as a nurse in the hospitals. On returning to the stage she was more popular than ever, and created a sensation at Paris even when Rachel was at the height of her power. Ristori's greatest rôles were Mary Stuart, in Schiller's drama of the same name, and Elizabeth, in a play by Giacometti.

RIVERS. Rivers have their beginning in rain drops. Some of the rain is soaked into the earth, but a portion of it runs off down the slopes and finally reaches the sea. An embankment by the roadside after a shower will furnish one with an illustration of all the facts about the formation of a river. The rain drops collect into little rills which unite to form larger rills, and these join one main stream that carries the water down the embankment. Rivers are formed in a similar manner, but on a larger plan. They usually have their origin far up in the mountains or hills, in a spring or a melting glacier. These mountain brooks unite to form larger brooks, which in turn unite to form a creek, and numerous creeks unite to form the main stream. This is the river, although it may be small. The creeks are the tributaries. The land bordering on the stream forms the *banks* of the river. That on the right when the observer faces down stream is the *right bank*; that on the left is the *left bank*. A *river system* includes the main river and all its tributaries. The region drained by a river system is a *river basin*. The height of land separating one river system from another is a *divide*.

Rivers receive their water from rain and snow, and from underground water. One-fourth of this quantity of water reaches the sea through rivers. Snow-capped mountains and glaciers sustain an important relation to rivers, since the melting snow and ice supply them with water during the summer, and in arid regions prevent them from running dry.

The rise and fall of rivers is due chiefly to irregularity of the rainfall over the river basin. A period of heavy rainfall is likely to cause floods. Excessively warm weather in early spring in those regions having a heavy fall of snow is also likely to cause floods. In periods of drought the rivers have their volume of water greatly reduced, and in arid regions they may run dry. Rivers fed largely from underground sources maintain a comparatively uniform volume. Forests are also important agents in preserving uniformity and preventing floods, because ground covered with forests absorbs a much larger portion of the rainfall than does the open country.

Work of Rivers. The form and size of a river channel depend upon the size of the stream and the degree of slope. The steepest

slope is usually in the upper part of the channel, where the stream and its tributaries have great velocity and consequently great force, often sufficient to enable them to remove from their bed all but the heaviest rocks. In this part of the course the channel is narrow, with steep banks, and usually it is free from bends.

The middle course is characterized by a more gentle slope, with lower banks and a wider channel. The current is slower, and is deprived of much of its power of transportation; consequently the large pebbles and coarse gravel which the stream carries along in its upper course are dropped here, and we find the river bed and the banks covered with rounded pebbles. As this material is deposited it fills up the channel, causing the stream to become broader and more shallow. In this part of the course there is still sufficient velocity to the current to enable it to carry the finer silt to the lower part of the course where it is deposited. The current is not strong enough to remove obstructions, so the river flows around them, and for this reason a river may have a number of great curves in its middle course. Among large rivers the Mississippi affords the best illustration of this feature. Moreover, obstructions in the bed of the stream catch more or less of the silt, and by this constant addition of material in time become low islands.

The lower course is characterized by low banks, a broad channel and a slow current. Much of the silt brought from the upper and middle parts of the course is deposited along the banks and on the adjoining land whenever there is an overflow, forming broad alluvial plains noted for their fertility. A portion of the silt is also deposited on the bed of the stream, so in this part of its course the river is constantly raising itself to a higher level. The Mississippi affords the most remarkable illustration of this feature, for here the river is higher than the surrounding country and disastrous floods are frequently caused by breaks in its banks.

Canyons and Ravines. In the work of rivers we see the most striking illustration of the old proverb:

"Water dropping day by day
Will wear the hardest rock away."

No rock is so hard that running water will not wear a channel in it. Some rocks—such as limestone and sandstone—wear more rapidly than others, and wherever rivers flow

through limestone or sandstone regions we find in places deep channels with nearly perpendicular walls. Such channels are called *canyons*. Some of these canyons, notably the Royal Gorge in Colorado, the Grand Canyon of the Yellowstone and the Grand Canyon of the Colorado, are among the most stupendous wonders of the world. Small tributaries to a river usually wear their channels down to a level with the main stream, forming narrow gorges called *ravines*.

Estuaries and Deltas. Where a river enters the sea, through a sunken or drowned valley which the tide ascends, its mouth is a broad estuary like the Gulf of Saint Lawrence and the Rio de la Plata. However, when rivers enter the sea by gentle flow the meeting of the current and the tide causes most of the silt to be deposited at the river's mouth. In this way large alluvial plains called *deltas* are formed. The deltas of the Nile, the Rhone and the Mississippi are the most noted in the world.

Related Articles. The important rivers of the world are listed in the articles on the various countries in which they are found. For additional information consult the following titles:

Alluvium	Delta	Flood Plain
Basin	Divide	Rain
Canyon	Erosion	Valley
Cataract	Flood	Spring

RIVERSIDE, CALIF., the county seat of Riverside County, sixty-five miles east of Los Angeles, on the Santa Ana River and on the Southern Pacific, the Atchison, Topeka & Santa Fé, the San Pedro, Los Angeles & Salt Lake, the Riverside, Rialto & Pacific and the Pacific Electric railroads. The city is noted for its beautiful streets, drives and public parks, and it has a number of hotels that accommodate many winter visitors. It is in one of the richest orange-growing sections in the world; close to the city are 20,000 acres in oranges. There are also grown lemons, grapes, figs and other fruits. The city has a Carnegie Library, a courthouse, an Indian school and a state citrus experiment farm. It was settled in 1870, incorporated in 1886, and has adopted the commission form of government. Population, 1910, 15,212; in 1920, 19,341, a gain of 27 per cent.

RIVER TORTOISE, *taw'rus*, the name of a family of tortoises that live in the water, coming to shore only to deposit their eggs. They live on fishes, reptiles and birds. Well-known species are the *soft-shelled turtle* and the large and fierce *snapping turtle* of America. They inhabit almost every river and lake

in the warmer regions of both hemispheres.

RIVES, *reevs*, AMÉLIE, Princess Troubetzkoy (1863—), an American novelist, born in Richmond, Va., of a distinguished family. In 1888 she married J. A. Chandler, whom she subsequently divorced, and in the same year published her first book, a collection of tales entitled *A Brother to Dragons*. The next year she created a sensation with *The Quick or the Dead*. This was followed by *According to Saint John*, *Barbara Deering* and *Athelwold*. Among her latest books are *The Golden Rose*, *Pan's Mountain*, *World's End*, *Shadows of Flames*, *Hidden House*, *The Ghost Garden* and *As the Wind Blew*.

RIVIERA, *revy'drah*, the narrow coast line of Italy and France that stretches for 172 miles along the Gulf of Genoa. The eastern half (Riviera di Levante) extends from Spezia to Genoa; the western half (Riviera di Ponente), from Genoa to Nice in France. The beauty and picturesqueness of its scenery and its mild climate lure thousands of tourists to its shores every year. The towns of both countries are linked by famous roads, originally built by the ancient Romans, and by railroads tunneled through numerous projecting headlands. Roses, violets and hyacinths are cultivated here for the London and Paris markets, as well as dates, bananas, pomegranates and prickly pears. Counted among the foremost towns of the Riviera are Nice, Monaco, Monte Carlo and Mentone, in France; Bordighera, Ospedaletti, San Remo, Rapallo, Levanto and Spezia, in Italy.

ROAD RUNNER, a curious bird of the cuckoo family, found in the southwestern



ROAD RUNNER

part of the United States and the northern part of Mexico. Its name refers to its peculiar trick of running swiftly down roads

in front of vehicles or horsemen. It is nearly two feet long, half the length being in the tail, which it can erect at right angles with its body. The body feathers are greenish-brown, each fringed with white. The head is steel-blue. The bird feeds on grains and insects, and builds its nest of sticks on low branches or on the ground. Other names for the bird are *snake killer*, *chaparral cock* and *ground cuckoo*.

ROAD RULES, regulations made for the safe passage of vehicles, in modern times usually decreed by statute or ordinance. In the United States, when two vehicles meet in a highway, both must turn to the right. If one vehicle overtakes another, it must pass to the left of the overtaken vehicle, which must itself turn to the right. Driving at excessive speed renders the driver liable, if accidents occur. At night vehicles must display lights. In the congested cities, these rules are amplified by the addition of many details and are extended to street cars as well as wagons and motor cars.

In England, vehicles meeting turn to the left and the overtaking vehicle bears to the right.

Rules for water travel involve a system of lights, fog signals, steering and sailing, distress and other signals. They were formulated in their present shape as the result of a maritime conference held in Washington in 1889.



ROADS AND STREETS. It has been said that roads and highways are an index to a nation's civilization. At all events, the older the nation, the better are its roads, a statement that can be verified by comparing the roads in Europe with those of the United States or Canada. Previous to the World War all the roads of Western Europe were improved, and a dirt road was an exception. In the

territory and have been settled so rapidly, that it has been impossible for the states and smaller communities to construct roads as fast as they are needed.

In America the terms *road* and *highway* are synonymous; however, the term *highway* is more frequently applied to improved roads connecting important points, while the term *road* is applied to common dirt roads. *County road* and *state road* are terms often used to designate important highways. *Street* formerly meant any paved road, but the name is now restricted to roads in cities and towns. All roads which have been officially designated as such are public, and everyone has the right to travel on them, with the exception of certain city streets, from which the authorities have the right to exclude heavy teaming which may destroy the surface.

Location and Management. Roads are usually located and land for them is set aside when the survey of a new country is made. If this is not done, they are located by state or county authorities, and the land is purchased. In case the owner is not willing to accept the price offered, his land is *condemned*; that is, it is taken for the road, and the price the owner receives for it is fixed by a commission appointed by a court. The owner of the property may give the land, but in order for it to become a highway the land must be accepted by the authorities, who are compelled by law to keep the road in repair. If an owner without protest allows the public to pass over a part of his property for a considerable period of time, the law will consider that he has by implication created a highway and will not permit him to close it.

In most countries, the authority over highways rests with the smallest political divisions, such as the parish in England and the town or county in the United States. However, in the United States the authority originally rested with the state, which has delegated its right to the smaller divisions. Though the public has a right to the use of the highway, it does not own the land over which it passes, but this ownership rests with the owners of the abutting property. This naturally implies a right in the public or in any traveler to the use of the whole highway, and therefore a right to remove an obstruction in any part of it, while it also implies the right of the owners of the abutting property to all the value of the land beneath

United States and Canada, outside of cities, only a small percentage of the roads have been improved, that is, surfaced with crushed stone, gravel or some other material. The condition of the roads in the United States and Canada is no disgrace to these countries at present, because they include so much

the street, that is, to mines or any other thing of value which is found there. Any legislature may establish private highways, giving the persons to whom it grants the road a right to exact toll or taxes from passers-by to pay for its repair.

Good Roads Movement. There are comparatively few surfaced roads in the United States and Canada, and many rural sections are practically deprived of means of transportation during certain seasons. Poor roads are the cause of the greatest loss of profit to a majority of the farmers of the country for the following reasons:

1. **Increased Expense of Hauling.** Careful estimates by the United States Department of Agriculture show that on a muddy earth road, the greatest load a horse can haul in an ordinary wagon is 800 pounds; on a dry earth road it is from 1,000 to 2,000 pounds, on a good gravel road about 3,300 pounds; on a macadam road, from 2,000 to 5,000 pounds; and on an asphalt road from 5,000 to 8,000 pounds. From this we see that on the best road one horse can do the work that it would require five or eight horses to do on a muddy earth road.

2. **Loss of Market.** Many farmers cannot market their crops at the time when prices are highest, because they are unable to move them on account of the condition of the roads. By the time the roads become passable, the season for that commodity has passed, or the market is overstocked and prices are lower.

3. **Value of Land.** One of the important conditions entering into the value of farm lands is access to a good market. Let two farms have the same quality of soil, and be equally distant from a market, one being on an improved road, and the other on a dirt road. The value of the farm on the good road will be considerably greater than that on the other.

Until recently, farmers have generally been opposed to levying taxes for the improvement of highways, but several influences have combined to change their views, and in many states large annual appropriations are now made for the purpose of constructing and improving the highways. The most important agencies in bringing about this movement for good roads are the Office of Public Roads, established in the United States Department of Agriculture in 1893, and reorganized as the Office of Public Roads and Rural Engineering in 1915, and the automobile, which has become a practical necessity.

Previous to 1914, the national government lent its aid chiefly through its "good roads train," or through small appropriations. But

in that year Congress passed a law providing for the annual appropriation of \$25,000,000, to be divided among the states for road improvement, each state government to provide an amount equal to that which it received. Many of the states had already made liberal appropriations for road improvement. The Sixty-fifth Congress (1917-1919) contracted to spend \$266,750,000 within the next three years for the construction and improvement of roads. Were this appropriation divided equally among the states each state would receive over \$5,500,000 to expend upon its roads. But the conditions of the appropriation are that each state must provide an amount equal to that which it receives. By 1923, thirty-four states had taken advantage of the Federal-aid system. The system extends nearly 200,000 miles, and the plan provides that over ninety percent of the entire population will live within ten miles of a Federal-Aid Highway.

Construction and Management. Formerly it was believed that anybody could make a road, and the construction and maintenance of roads was in the hands of those through whose territory the road passed. To-day road-making has become a highly developed branch of engineering. In the construction of a road, the following points should receive careful attention:

(1) **Location of the Road.** It should be run so that it will connect within shortest distances the points between which it extends, provided this can be done without incurring steep grades. In mountainous and hilly countries, most careful engineering is often necessary to locate a road so as to avoid grades that are a great hindrance to the hauling of heavy loads.

(2) **Shaping of the Roadbed.** The earth upon each side is usually plowed and scraped onto the roadbed, where it is given a rounded surface, either by means of a road machine, called a grader, or by hand labor.

(3) **Surfacing.** Earth roads should be covered with gravel or crushed stone. This material should be pressed down onto the road by a heavy steel roller. It protects the surface, allows the hauling of heavy loads and renders the roadbed much more durable; hence, although surfacing is attended with considerable expense, it is economical.

In many localities cement or asphalt are used for surfacing, since they make a smooth, durable road for ordinary travel. They are not suitable, however, for roads on which there is much heavy traffic.

With the improvement of roads and modern methods of construction, the management

has passed from the petty officials of a local community to the county and the state, and is placed in the hands of road engineers who, with their assistants, see that the roads under their supervision are kept in repair. They also lay out and supervise the construction of new roads that are authorized.

National Roads. The United States government constructs and maintains the roads in the national parks, but, aside from these, it has built but one national road, the Cumberland Road (which see), extending from Cumberland, Md., to Vandalia, Ill. The automobile interests and the good roads movement, however, have led to the formation of associations having for their purpose the construction of great national highways, connecting distant parts of the country. The most noted of these projects are the Dixie Highway and the Lincoln Highway, each of which is described under its title. See PAVEMENT.

ROANOKE, VA., in Roanoke County, fifty-four miles west of Lynchburg, on the Roanoke River and on the Norfolk & Western and the Virginian railroads. It has a picturesque location near the Blue Ridge Mountains. It is the seat of Virginia College for women and Rebekah Sanitarium. Hollins Institute, a large female college, is six miles north of the city, and in the vicinity are Roanoke and Elizabeth colleges. The city also has an academy of music, an auditorium and armory, a Federal building and a city hall. Roanoke was formerly a great tobacco market, but it is now more important as an iron-manufacturing center. It contains rolling mills, car and locomotive works, tobacco factories, bottling works, knitting mills and other factories. Railroad shops employ 3,000 men. The city was incorporated in 1884. Population, 1910, 34,874; in 1920, 50,842, a gain of 46 per cent in ten years.

ROANOKE RIVER, a river formed in Virginia by the union of the Dan and the Staunton. It flows eastward for a short distance in Virginia, then enters North Carolina and, pursuing a southeasterly course of about 185 miles through a picturesque valley, enters Albermarle Sound. It is navigable for 120 miles.

ROBBERY, a major crime by which there is taken from a person, by violence or intimidation, property of value either on his person or under his protection. Violence and

intimidation are the characteristics which distinguish robbery from other larcenies, and it is sufficient that so much force or threatening, by word or gesture, is used as might create an apprehension of danger of suffering personal violence and might lead a man to part with his property against his will. The punishment is now usually imprisonment for long periods. *Highway robbery*, or the forcible taking of property from travelers, in many countries is a capital offense, and in all civilized countries it is severely punished. See LARCENY.

ROB'BIA, DELLA, the name of a famous family of Italian sculptors who flourished in the fourteenth and fifteenth centuries.

Luca Della Robbia (1399-1482), was distinguished for his work in terra cotta, of which by a secret process he made a glazed or enameled variety. He was also distinguished for his work in marble and bronze. His reliefs were found in many churches and other public edifices. The fame of his work spread over Europe, and his madonnas and saints made him the typical religious sculptor of his time.

Andrea Della Robbia (1437-1528), was a nephew of Luca. He is especially famous for his colored reliefs in terra cotta, for Santa Maria delle Grazie, the Cathedral of Arezzo and the loggia of the Hospital of the Innocents, in Florence.

ROBERTS, CHARLES GEORGE DOUGLAS (1860-), a Canadian poet and story writer, was born at Douglas, near Fredericton, New Brunswick, and educated at Fredericton Collegiate School and the University of New Brunswick. He was professor of English and French literature in King's College in 1885-1887, and of economics and international law in 1887-1895. In 1897-98 he was associate editor of the *Illustrated American*, New York. Among his more important writings are *Orion and Other Poems*, *Songs of the Common Day*, *New York Nocturnes*, *The Canadians of Old*, *Around the Camp Fire*, *A History of Canada*, *The Kindred of the Wild*, *Barbara Ladd*, *The Little People of the Sycamore*, *The Backwoodsman*, *Kings in Exile*, *Neighbors Unknown*, *Feet of the Furtive*, *Children of the Wild and Hoof and Claw*.

ROBERTS, FREDERICK SLEIGH, EARL ROBERTS OF KANDAHAR, PRETORIA AND WATERFORD, (1832-1914), a British soldier, born at Cawnpore, India, affectionately known

throughout the world as "Bobs." He received his training at the Royal Military College at Sandhurst and the college of the East India Company at Addiscombe, India. For over forty years he was connected with the Indian army, rising to the position of commander-in-chief in 1885. He frequently distinguished himself for personal bravery, for skill in transporting troops and equipment and for brilliant tactics. In 1899 and 1900 he was commander in chief in South Africa. For his services in the South African War he was awarded \$500,000 by Parliament and given supreme command of the British army. He died November 14, 1914, from pneumonia, contracted while on a visit to the Indian troops who were on the battle front in France.

ROBESPIERRE, *roh spe air'*, MAXIMILIEN MARIE ISIDORE (1758-1794), one of the most prominent of the French revolutionists, was born at Arras and educated in the College of Arras and the College of Louis-le-Grand at Paris. He practiced law in Arras with eminent success, and was elected criminal judge. This position, however, he resigned in a short time, because he would not pronounce a death sentence. At this time he was known as a man of integrity, possessed of a kindly nature.

Robespierre held and strongly advocated the liberal democratic views so popular among the French middle classes. In 1789 he was elected deputy to the States-General, or National Convention; from that time he was the leader of the radicals in the convention, and before the close of 1791 he had become the most popular of the revolutionists. In the trial of Louis XVI, he stood strongly and successfully for the death sentence. By the help of Danton and his followers he brought about the downfall of the Girondists and later of the followers of Hébert, who were carrying the Reign of Terror farther than seemed right to Robespierre. Shortly afterward he caused Danton to be arrested and guillotined.

Robespierre's power now seemed to be completely established, and the Reign of Terror was at its height; but although his

name more than any other has always been connected with the Reign of Terror, his authority was by no means absolute. Robespierre was a theorist, working toward an ideal state of society, and he felt that the excesses of the Terror were the only means by which that state could be established. His power aroused alarm in the Convention, a party was formed against him and in July, 1794, he was openly accused of despotism. A decree of arrest was carried against him, and he was thrown into Luxembourg prison. He was released by his keeper on the night of the same day and was conducted to the Hall of Commune, where his supporters were collected. On the following day Barras was sent with an armed force to effect his arrest. Robespierre's followers deserted him, and he was guillotined on July 28, 1794, together with some twenty-three of his supporters. See FRENCH REVOLUTION.

ROBIN, or, sentimentally, **ROBIN RED-BREAST**, is the name given to quite different songbirds in Europe and America. In European countries the robin is a small thrush, whose cheerful song is a great favorite and whose friendly ways make it familiar everywhere.

The American robin is a larger bird, measuring about ten inches from beak to tail, whose song is not especially fine, but whose



ROBESPIERRE



AMERICAN ROBIN

sociability and friendliness make it a welcome visitor. Its plumage is very pretty, the orange-red breast being conspicuous against

the olive-gray upper parts, the brownish wings and black head. It builds a strong nest of hay and mud and lays from four to six greenish-blue eggs. Two broods are produced in a year.

Because the robin is the first bird of the year to return from the South, it is recognized as the harbinger of spring. Robins are voracious, considerable of their food consisting of fruit, especially cherries and wild berries. Farmers protect their cultivated cherries and berries from the birds' encroachment by planting wild shrubs near by; but the robin is of service to the farmer also in that its food consists largely of insects and worms. Robins are protected from indiscriminate slaughter in the United States as well as in Canada.

ROBIN HOOD, a celebrated English outlaw, who according to the popular account, inhabited with his followers Sherwood Forest, in Nottinghamshire, and the woodlands of Barnsdale, in the adjoining West Riding. They supported themselves by levying toll on the wealthy, especially on ecclesiastics, and by hunting the deer of the forest. The principal members of his band were his lieutenant, Little John; his chaplain, Friar Tuck; William Seathlock; George-a-Greene; Much, the miller's son, and Maid Marian. The tales of Robin Hood formed the basis for many old ballads, and his adventures served as the foundation of a very successful light opera.

ROB'INSON CRU'SOE, a celebrated romance by Daniel Defoe, published in 1719. The story is supposed to be founded on the experiences of Alexander Selkirk, who was shipwrecked on Juan Fernandez, an uninhabited island off the coast of Chile, and remained there for years. It is one of the most famous of all adventure stories, and shows what a man, alone with nature and with no tools but his hands, can accomplish. The accounts of the shifts to which Crusoe was forced to resort, his ingenuities and his inventions, are given in Defoe's most realistic style, and this first novel has retained much of its original popularity to the present day. See JUAN FERNANDEZ; SELKIRK, ALEXANDER.

ROB ROY (1671-1734), a celebrated Scotch outlaw, whose exploits are described in Scott's novel *Rob Roy*. His true name was ROBERT MACGREGOR, but he assumed his mother's name, Campbell, because the clan Macgregor was outlawed by the Scotch parliament. The name *Roy*, meaning *red*, was

given him because of his red hair and ruddy complexion. He was famous for his skill with the sword, and his great strength. He inherited land in the Highlands and raised cattle for the English market, and found it necessary to keep around him a band of armed men to protect his cattle from thieves. Having engaged unsuccessfully in speculation, he borrowed large sums of the Duke of Montrose, and when he was unable to pay his loan, the duke deprived him of his land. Rendered desperate by his ill fortune and this act of the duke, Rob Roy became an outlaw, and for several years made constant warfare on the duke, carrying off his cattle. By his skill and bravery he foiled all attempts to capture him and for a long time deprived the nobles of their cattle and their rent money. In 1722 he gave himself up to the English authorities, by whom he was imprisoned for a time, then pardoned.

ROB'SON, MOUNT, the highest mountain in British Columbia, is located in the southeastern part of the province, near the boundary between British Columbia and Alberta. Its altitude is 13,068 feet.

ROC, rok, an enormous bird of Arabian mythology, which figures in *The Arabian Nights' Entertainment*. Sindbad the Sailor found a roc's egg that was fifty paces in circumference. When the bird settled down upon it, Sindbad tied himself to one of her legs and was carried away. The roc is purely an imaginary creation.

ROCHAMBEAU, *ro shahN bo'*, JEAN BAPTISTE DONATIEN DE VIMEUR, Count de (1725-1807), a marshal of France who rendered the American colonies valuable service during the Revolutionary War. He studied for the priesthood, but entered the French army in 1742, fought in the War of the Austrian Succession and distinguished himself in the Seven Years' War. In 1780 he was sent to America with 6,000 men to aid the colonists in the Revolutionary War. Placing himself under the command of Washington, he rendered valuable assistance at the siege of Yorktown. On his return he became governor of Artois and Picardy and subsequently of Alsace; was made a marshal in 1790, and commanded the Army of the North in 1792. During the Reign of Terror he narrowly escaped the guillotine. Napoleon restored him to his former rank.

ROCHEFOUCAULD, *rosh foo ko'*. See **LA ROCHEFOUCAULD**

ROCHESTER, MINN., the county seat of Olmsted County, about 107 miles southeast of Saint Paul, on the Zumbro River and on the Chicago & North Western and the Chicago Great Western railroads. The city is in a rich agricultural region, where wheat and live stock are the principal products. There are large grain elevators, flour mills, a foundry and a camera manufactory. The prominent buildings include the Mayo clinic, a Masonic Temple, an Odd Fellows' building, a Y. M. C. A., a community house, the Commercial Club, Saint Mary's Hospital, a convent, a courthouse and a city hall. A state hospital for the insane is located here, and the city has four banks. Rochester is famous as the home of Dr. Charles H. and Dr. William J. Mayo (which see). The place was settled in 1854, and the city was chartered four years later. Population, 1910, 7,844; in 1920, 13,722, a gain of 75 per cent.

ROCHESTER, N. Y. the county seat of Monroe County, and the third largest city of the state, ranking below New York City and Buffalo. It is seventy miles east of Buffalo, on the Genesee River and Lake Ontario. The river falls 261 feet in three cataracts within the city limits, which include what was formerly Charlotte, now the city's lake port.

The New York State Barge Canal is tributary to the city by a branch five miles long. The Genesee River is crossed within the city by a dozen bridges, one of which is 990 feet long and 212 feet high. The city is served by the New York Central, the West Shore, the Erie, the Lehigh Valley, the Pennsylvania and the Buffalo, Rochester & Pittsburgh railroads. There are twenty parks, with a total area of about 1,700 acres. The Genesee Valley Park comprises 340 acres; Durand-Eastman, on the shores of Lake Ontario, has 484 acres. The public buildings of importance are a granite courthouse, a city hall, a Chamber of Commerce, a Masonic Temple, a state arsenal, the Genesee Valley Clubhouse, the Municipal buildings, a Y. M. C. A., and a Convention Hall. The Eastman Theatre, opened in 1922, is one of the largest and most beautiful in the world. It is owned and operated by the University of Rochester for the enrichment of community life. The University of Rochester has a new \$9,000,000 Medical School and a Dental School and Dispensary. Other educational institutions are the Rochester Theological Seminary, Saint

Bernard's Seminary (Roman Catholic), Rochester Normal School and the Mechanics' Institute, an industrial school. The libraries include the Reynold's Public Library, 50,000 volumes, the Seneca Library and the law library, and there are nine public and three private hospitals. Among the charitable institutions of importance are the Western New York Institutions for the Deaf, the state industrial school, a state hospital for the insane, the county almshouse and a number of hospitals and asylums maintained by religious denominations.

Rochester is an important manufacturing city, and its prosperity is due largely to the great water power furnished by the Genesee River. It has over 1,700 manufacturing establishments, and these employ 75,000 persons. It contains the world's largest plants for the manufacture of optical goods, cameras and thermometers, and is also the first city in the United States in the canning of fruit. It has many boot and shoe factories, and is the fourth city in the country in this industry. Over sixty per cent of the carbon paper and typewriter ribbon used in the United States comes from Rochester. Other industries include machine shops, furniture factories, agricultural implement works, wagon factories and manufacture of filing devices for offices. Formerly the city was the foremost in the Union in the manufacture of flour, but with the development of the great wheat fields in the Northwest, this industry declined. Other industries in which Rochester leads the country, and in some respects the world, are its nurseries and its trade in garden seeds, fruits and plants.

The place was first occupied by white men in 1788, but the first actual settlement did not take place until 1810. Seven years later the village was incorporated, and in 1834 it became the city of Rochester. In 1908 its present city charter became effective. Population, 1910, 218,149; in 1920, 295,850, a gain of 36 per cent.

ROCK, in geology the term applied to the solid part of the earth. To the geologist, sand and gravel are rock. A small piece of rock is called a *stone*, and the same term is applied to rock used for building material. The various methods by which rock is formed are described in the article GEOLOGY. Rocks are classified, according to their formation, into *igneous*, *stratified* and *metamorphic*. Nearly all known substances are found in

the rock envelope of the earth; only a few, however, occur in large quantities. Oxygen and silicon are found in nearly all rocks; aluminum is the basis of clay; calcium is found in limestone, and magnesium occurs in rocks containing magnesia.

Related Articles. Consult the following titles for additional information:
 Glacier Metamorphic Rocks
 Igneous Rocks Stratified Rocks

ROCKEFELLER, JOHN DAVISON (1839-), an American capitalist, probably the richest man in the world, and the chief organizer of the Standard Oil Company. He was born in Tioga County, N. Y., and educated in the public schools of Cleveland, Ohio. At the age of nineteen he entered the commission business on his own account, and two years later engaged in the oil business in Cleveland. In 1870 Rockefeller became president of the Standard Oil Company, which was consolidated with other concerns in 1882, forming the Standard Oil Trust. This was dissolved ten years later, the constituent corporations being managed separately.



JOHN D.
ROCKEFELLER

In 1911 Rockefeller retired from active management of his business interests, and thereafter gave his chief attention to philanthropy. He was the founder of the new University of Chicago, to which he contributed over \$23,000,000. The General Education Board, the Southern Education Board, Harvard and Yale universities, Vassar College, Barnard College and many other institutions have enjoyed the benefits of his liberality. He also generously endowed two great institutions for the alleviation of the sufferings of humanity—the Rockefeller Institute and the Rockefeller Foundation. In 1919 he gave \$50,000,000 to the general education board, and a like sum to Rockefeller Foundation.

ROCKEFELLER FOUNDATION, a philanthropic trust founded by John D. Rockefeller, whose original bequest to the enterprise was \$100,000,000. The Foundation was incorporated by the legislature of New York in 1913. The original bequest was made that the "well-being of mankind should be promoted throughout the world." In May, 1917,

another bequest of \$25,000,000 was made, and \$50,000,000 in the latter part of 1919. The Foundation is under the management of a self-perpetuating board of trustees, and the income from the endowment is expended in research work for suppressing disease, in aiding other institutions in prosecuting special lines of research, and in giving direct relief where conditions warrant it.

After the outbreak of the World War great sums were appropriated for relief work in Belgium and for Red Cross work. The expenditures of the Foundation for war work amounted to \$17,042,140, and the total expenditures for the welfare of mankind throughout the world during the period amounted to \$26,509,710. A fund of \$2,000,000 has been set aside for building a medical college at the University of Chicago, and over \$2,500,000 has been given the Institute for Medical Research, besides various sums to leading educational institutions, including the American Academy in Rome. Only men of the highest degree of training in their respective fields are employed by the management.

ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH. This institute was founded in 1901 by John D. Rockefeller, who endowed it with over \$8,000,000. Its object is to further medical research. The property and endowment funds are in the hands of five trustees; the management is entrusted to a board of seven directors. The instructions of the founder were to administer the trust in such a way as to "accomplish the most for humanity and science." A laboratory, hospital and other necessary buildings have been erected in New York, and a corps of experts devote their entire time to research work. A great deal has already been accomplished. Departments of bacteriology, pathology, physiological and pathological chemistry, comparative zoölogy, pharmacology and experimental therapeutics are maintained. The institute also coöperates with boards of health, medical colleges and other organizations in studying and overcoming disease.

ROCKFORD, ILL., the county seat of Winnebago County, eighty-five miles northwest of Chicago, on the Rock River and on the Chicago, Burlington & Quincy, the Illinois Central, the Chicago & North Western, the Chicago, Milwaukee & Saint Paul and the Chicago, Milwaukee & Gary railroads. The city is surrounded by an agricultural region, and has a beautiful location on both sides of

the river. Some of the prominent buildings are Memorial Hall, a courthouse, a city hall, two hospitals and a Carnegie Library. The city is the seat of Rockford College, a notable school for women, and it has a parish school and a business college. North of the city is a sanitarium, and in the southern part of the town is another. A dam across the river affords water power for numerous manufacturing establishments. Rockford is sometimes called the "Furniture City," in recognition of its leading product; other manufactures include hosiery, knit goods, agricultural implements, sewing machines, saddlery, watches, silver-plated ware, paper and flour. It was settled in 1834 and was chartered as a city in 1852. Population, 1910, 45,404; in 1920, 65,651, a gain of 45 per cent.

ROCK HILL, S. C., in York County, about eighty miles north of Columbia on the Southern Railroad. The city is an educational center, the seat of Winthrop Normal and Industrial College of South Carolina, for women. There is a Carnegie Library and an infirmary. It is in an agricultural district in which cotton, alfalfa and fruit are extensively grown. There are cotton mills, a carriage works and manufactories of brick, jute bagging and fertilizer. Population, 1910, 7,216; 1920, 8,809.

ROCK ISLAND, ILL., the county seat of Rock Island County, 180 miles nearly west of Chicago, on the Mississippi River, opposite Davenport, Iowa, on the Hennepin Canal and on the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & Saint Paul, the Rock Island Southern and the Davenport, Rock Island & North Western railroads. A large United States arsenal and armory is on the island of Rock Island, between the two cities. The island covers about a thousand acres, and the property of the government is worth \$10,000,000. A large combination railroad and wagon bridge constructed by the Chicago, Rock Island & Pacific Railroad and the United States government spans the river from the city to the island and thence to Davenport. Another bridge connects the island with the city of Moline. The river between the island and Davenport is navigable, while the Federal government has constructed a dam on the Rock Island side. This supplies extensive water power for manufacturing, and the principal establishments are plow works, lumber mills, railroad shops,

oil-cloth works, the arsenal and various other factories. Augustana College and Theological Seminary is located here, and the city has Saint Anthony Hospital, a library and a Federal building. The place was settled in 1836, and the city was chartered in 1849. The city is governed on the commission plan. Population, 1910, 24,335; in 1920, 35,177 (Federal census). With Davenport and Moline there is a metropolitan district of more than 100,000 people.

ROCK SALT. See SALT, subhead *Rock Salt*.



ROCKY MOUNTAINS, the name commonly applied to that great mountain system extending through North America from Central America nearly to the Arctic Ocean, and forming the "backbone of the continent." In the larger works on geography this mountain system is frequently called the Pacific Cordillera. In the sense in which modern geographers use the name, however, it applies only to

the eastern ranges of this great system north of Mexico. In the latter country the system is known as the *Cordilleras*. The Rocky Mountains of Canada are known as the *Canadian Rockies*.

Divisions and Ranges. In the United States and Canada this great chain of mountains is composed of numerous ranges and groups of ranges, separated from one another by valleys and plateaus. The first great division is made by the Laramie Plateau, a large tract of level land from 7,000 to 8,000 feet in altitude, crossing the southeastern part of Wyoming. It was over this plateau that the first transcontinental railway, the Union Pacific, found a path leading to the Pacific coast.

South of the Laramie Plateau, there is a group of ranges which together are called the Park Mountains, because they surround large tracts of comparatively-level land. The most extensive of these, San Luis Park, extends from Southeastern Colorado into New Mexico, and is 130 miles long and from twenty to forty miles wide. The Rio Grande traverses the entire length, and is fed on the way by numerous mountain streams. However, owing

to the arid climate and intense heat of summer, the park is barren land. One of the most majestic peaks, Sierra Blanca, with an altitude of over 14,000 feet, rises on the eastern border.

The individual summits as well as the various ranges comprising the Park Mountains are remarkable for their massiveness, their great altitude and their picturesque scenery. Over thirty peaks in this group have altitudes exceeding 14,000 feet, and the portion of this region whose altitude exceeds 10,000 feet is far larger than any other area of similar altitude on the continent. Among the most widely-known summits in the group are Pike's Peak and the Mount of the Holy Cross. The valleys or passes between these ranges are traversed by railways and afford the traveler opportunity to behold some of the grandest scenery in the world. The system attains the greatest breadth in this region, being about 1,000 miles wide on a line running from San Francisco through Denver and Kansas City.

North of the plateau, the Bitter Root, forming a portion of the boundary between Montana and Idaho; the Bighorn, in Western Wyoming; the Tetons, south of Yellowstone Park, and the Wind River Mountains, in Wyoming, are the most important ranges. Fremont's Peak, with an altitude of 13,790 feet, is the highest summit in this group. These ranges extend more nearly north and south, and the park feature is not prominent, with the exception of Yellowstone Park, which is a plateau surrounded by lofty ranges.

Although the summits of the Canadian Rockies are lower than many in the United States, many of the peaks themselves are higher; consequently, the scenery in the Canadian Rockies is more striking and awe-inspiring than in the United States. This is because the summits in the United States rest upon a plateau from 5,000 to 8,000 feet in altitude, while in Canada this plateau has an altitude of only 3,000 to 4,000 feet. Many of the highest summits in the Canadian Rockies have large glaciers, and in this respect resemble the Alps. West of the main ranges are subordinate ranges, including the Selkirks and the Gold Range. Mount Robson, in British Columbia, with an altitude of 13,000 feet, is the highest peak in the group.

General Character of the Mountains. The Rocky Mountains were formed by volcanic

action which threw large quantities of molten rock from the earth's interior, and by folding of the earth's crust. They were formed later than the Appalachian Mountains. Their summits have not been worn down by the action of water, and consequently their general character is rugged. The eastern escarpment is usually higher and more abrupt than the western. In those regions where there is sufficient moisture, the sides are clothed with forests up to the tree line, but in the arid regions they are bare. The entire system is rich in minerals, and valuable deposits of gold, silver, copper and lignite are found in many places. The ores are quite extensively worked, but only a little coal has yet been mined. The ranges comprising the Rocky Mountain system are described under their respective titles.

See CASCADE RANGE; COAST RANGE; SELKIRK MOUNTAINS; SIERRA NEVADA, and other similar titles.

ROCKY MOUNTAINS PARK. See PARKS, NATIONAL.

ROCKY MOUNTAIN WHITE GOAT, an animal of the goat-antelope family, inhabiting the higher altitudes of the Rocky Mountains from California to Alaska. It is about three feet high, and in both sexes there are slender black horns curving backward. The small hoofs are also black. It has a long, silky, pure white coat, which enables it to conceal itself in the snow. It is very skilful in climbing and rapid in its movement, so that hunting it is an exciting and not always a successful pastime. It is never found in large flocks, but as the range of any animal is not very great, its paths, or trails, are often clearly beaten into the ground. Its flesh is good to eat, and its hide is valuable for making rugs.

RODENTS, or **RODENTIA**, *ro den'she a*, an order of mammals represented by mice, rats, gophers, squirrels and a number of other well-known animals. The rodents are gnawers, and their distinguishing characteristic is the possession of large, chisel-like front teeth which enable them to gnaw hard substances. These teeth have a hard enamel on the outside and a softer enamel on the inside, so they have an edge shaped like that on a chisel.

There are more than twenty families and several thousand species in the order. They vary in size from the mouse, the smallest, to the capybara of South America, which is

four feet in length. In general, they are furry, though sometimes they are spiny; they walk flat-footed, and their toes are armed with claw-like nails, or resemble parted hoofs. They live chiefly upon the ground, though a few are tree lovers, and some are aquatic. In the back part of the mouth is a cavity, in which the rodents can store substances that are being gnawed, without taking the chips into the mouth proper. Most of them are active, vigorous animals, and some have become great pests to the human family.

Related Articles. Consult the following titles for additional information:

Agouti	Guinea Pig	Pika
Bandicoot	Hamster	Porcupine
Beaver	Hare	Prairie Dog
Chinchilla	Hedgehog	Rabbit
Chipmunk	Jerboa	Rat
Dormouse	Marmot	Squirrel
Flying squirrel	Mouse	Vole
Gopher	Muskrat	Zoölogy

RODIN, ro'dan, AUGUSTE (1840-1917), the foremost French sculptor of his century, and one of the greatest of all time, was born in Paris. He introduced an entirely new technic in the handling of marble and subject. His powers developed early, and at twenty-two he executed a very fine study called *Broken Nose*. During the Franco-German War he served in the National Guard and afterwards lived for a time in Brussels. In 1877 he exhibited at Paris his *Age of Bronze*, which, be-



AUGUSTE RODIN

cause of its daring realism, created a sensation. This was followed by a bust of Saint John (Metropolitan Museum, New York), *Saint John Preaching* and *The Thinker*, the last probably his best-known work. His *Bourgeois de Calais*, a work of intense naturalism and dramatic power, is one of the great achievements of modern sculpture. *Adam and Eve* and the *Bather*, both in the Metropolitan Museum, New York, *The Kiss*, *Francesca da Rimini* and the *Sphinx* are other works of supreme genius.

The work of Rodin is not merely that of a master of anatomy and composition; it is the work of a psychologist. The wonderful texture of flesh, the realistic suggestion of muscular strength, are not more remarkable than the intellectual significance of his subjects.

He introduced an entirely new method of finishing surfaces—a method which marks one of the chief technical advances in sculpture. Instead of the slick and shiny finish of the classic school he produced a surface the texture of loaf sugar—extremely beautiful and naturalistic.

ROE, EDWARD PAYSON (1838-1888), an American clergyman and novelist, born in Orange County, New York. On the completion of his theological studies, he became a chaplain in the volunteer service; afterwards he was pastor of a Presbyterian church at Highland Falls, N. Y. The great Chicago fire of 1871 furnished him with a subject for his first novel, *Barriers Burned Away*. He resigned his pastorate and settled at Cornwall-on-the-Hudson in 1874, where he devoted himself to literature and the cultivation of small fruits. Fifteen novels came from his pen, all of which have been reprinted in Great Britain and have been widely read on both sides of the Atlantic. The best known are *Near to Nature's Heart* and *Opening of a Chestnut Burr*. He also wrote *Play and Profit in My Garden* and *Success with Small Fruits*.

ROEBLING, ro'bling, JOHN AUGUSTUS (1806-1860), the builder of the Suspension Bridge across the gorge at Niagara, and designer of the Brooklyn Bridge over East River, New York, was born in Muhlhausen, Prussia, and educated in the Polytechnique School at Berlin. He emigrated to America in 1831 and settled in Pittsburgh, was made assistant engineer of slack-water navigation on the Beaver River, and later surveyed the route followed by the Pennsylvania Railroad across the Allegheny Mountains. He then engaged in the manufacture of wire rope, which he used in constructing suspension aqueducts and bridges. Roebling's success in this line of work soon gave him a wide reputation, and when it was decided to construct a bridge across the gorge at Niagara in 1852, he was called upon to direct the work. For years, the Niagara Suspension Bridge was the greatest structure of the kind in the world, and its completion was an epoch-making event in transportation in the United States.

The Brooklyn Bridge was the first suspension bridge across East River, and was a much greater undertaking than the Niagara bridge. The plans for this bridge were all completed under Roebling's supervision, but

he died before the work of construction was begun, and this was carried on under the direction of his son, William A.

ROE'BUCK, a European deer of small size, the adult measuring about two feet in



ROEBUCK

height at the shoulders. The antlers, about eight inches long, are small and rough and have two sharp tines. The body is reddish-brown in summer and becomes a pale olive as winter approaches. These animals inhabit mountainous and wooded districts. When irritated or alarmed, they prove very dangerous adversaries and are able to inflict severe wounds with their antlers. They are seen in solitary pairs, which mate for life.

ROENTGEN, *runt'gen*, **RAYS**, or **X-RAYS**, the name given peculiar rays discovered in 1895 by Professor William Roentgen of the University of Wurzburg, while he was experimenting with Crookes tubes. Prof. Roentgen gave them the name X-rays because he did not understand their nature. The name was afterwards changed to *Roentgen rays* in honor of their discoverer.

The apparatus for producing Roentgen rays consists of an irregular globular tube, into each end of which a platinum wire is passed, to serve as a conductor, and from which the air has been exhausted as completely as possible. A concave disk of aluminum is attached to the *negative*, or *cathode*, pole, and a flat disk of platinum to the *positive*, or *anode*, pole. The platinum plate is placed at the focus of the aluminum disk and

at an angle of 45° to its plane. When a strong electric current is passed through the tube the platinum disk is heated red hot. It is upon this disk that the Roentgen rays are produced, and they pass out through the walls of the bulb.

Roentgen rays are invisible, and can be detected only by their effects. They cannot be reflected or refracted like rays of light, and they pass through many substances that are opaque to light rays, such as wood, paper, cloth and muscular tissue. They will not pass through glass or lead. Certain substances, as compounds of calcium, barium and platinum, become luminous when exposed to cathode or negative rays, and in a dark room they give off light of a peculiar color. If an object is placed between a screen coated with one of these substances and a Roentgen ray tube, its shadow will appear on the screen provided it is opaque to these rays. For example, if the hand is placed between the screen and the tube, a mere outline of the muscular tissue will appear, while the bones will form a dark shadow, so that the skeleton of the hand is distinctly seen. A ring on the finger will give a still darker shadow than the bones. A pencil with a metallic head shows the head and the lead core, but not the wood encasing it.

Uses of Roentgen Rays. The peculiar properties of Roentgen rays make them of value to physicians for detecting the condition of broken bones, locating objects that have entered the body, such as bullets and needles, and occasionally for studying the action of the heart, since by use of a sufficiently powerful apparatus a shadow of the entire human skeleton can be produced and even the beating of the heart can be seen. Caution should be exercised in using X-rays, since any tissue is injured by too long an exposure to them.

Wilhelm Konrad Roentgen (1845-1923), the discoverer of the Roentgen rays, was born near Zurich, Switzerland, and educated at Utrecht. He held several important educational positions, previous to 1879, when he was elected professor of physics at the University of Wurzburg, Bavaria. There in 1895 he discovered the rays which gave him a worldwide reputation.

ROGERS, JOHN (1829-1904), an American sculptor, born in Salem, Mass. He was educated at Rome and Paris, but returned to the United States where he first gained

prominence by his sculpture *The Slave Auction*. During the Civil War he executed several small groups of war subjects, which became very popular, but he is more widely known by his groups representing scenes in American life. Among his most popular groups are *John Alden and Priscilla*, *The Town Pump*, *Going for the Cows* and *The Charity Patient*. These have been extensively reproduced in bronze, and in casts for schools. The statue of General Reynolds in front of the City Hall, Philadelphia, is one of his most celebrated large works.

ROGERS, RANDOLPH (1825-1892), a famous American sculptor, born at Waterloo, New York. He engaged in business in New York and Ann Arbor, Michigan, and in 1846 he went to Rome, where he studied for four years with Bartolini and other sculptors. Upon his return he acquired a reputation. His statues, *Nydia*, *the Blind Girl of Pompeii* and *Boy and a Dog*, among them, are worthy of high praise. From 1855 until his death he lived in Italy. He designed and modeled the bronze doors of the addition to the Capitol at Washington, built in 1855, and he made the figures of Marshall, Mason and Nelson for the Richmond (Va.) Washington Monument. His most celebrated works are the colossal statue *America* (Providence, R. I.), *Genius of Connecticut* (Hartford), and a figure representing the state of Michigan (Detroit). He also made the great statue of Lincoln in Philadelphia.

ROHLFS, rolfs, ANNA KATHARINE GREEN (1846-), an American story writer, who since the publication of *The Leavenworth Case*, in 1881, has written more than fifty other detective stories, a larger number than any other American author has produced. She was born at Brooklyn, N. Y., educated at Ripley College (Vt.), and was married, in 1867, to Charles Rohlf. Among her latest books are *The House of the Whispering Pines*, *Initials Only*, *Masterpieces of Mystery* and *Golden Slipper and Other Problems for Violet Strange*.

ROLAND, a celebrated hero of the romances of chivalry. According to story, he was a nephew of Charlemagne, in whose army he fought against the Saracens in Spain. He was a brave, unsuspecting, loyal warrior, of simple disposition. According to the *Song of Roland*, an old French epic, he was killed in the Battle of Roncevaux, after a desperate struggle with the Saracens, who had at-

tacked Chalemagne's rear guard. In Italian literature he is known as Orlando. Boiardo's celebrated romantic epic *Orlando Innamorato* and Ariosto's *Orlando Furioso* are stories of Roland and his exploits.

ROLAND DE LA PLATIERE, *ro lahN' de la platyair'*, MARIE or MANON JEANNE PHILIPON, Madame (1754-1793), a Frenchwoman who was very prominent during the early part of the French Revolution. She was precocious from childhood and delighted especially in philosophical and ethical works. She married, in 1780, Jean Marie Roland de la Platière. Shortly after the outbreak of the Revolution, her home became the meeting place for the Girondist leaders, and she was active in support of the Girondists, even after they lost their influence. In June, 1793, she was thrown into prison, and in November of the same year she was executed. Just before her execution she uttered words that have become historic: "O Liberty! what crimes are committed in thy name!" During her imprisonment she wrote memoirs.

ROLFE, JOHN (1585-1622), one of the early English colonists in America, celebrated as the husband of the famous Indian Princess Pocahontas. When Rolfe landed in Virginia, in 1610, he saw Pocahontas at Jamestown, where she was held as a hostage by the deputy-governor for the purpose of bringing her father, the powerful chief Powhatan, to terms. Rolfe married her and took her to England. One son was born to them, and his descendants have figured prominently in Virginia history. John Rolfe is said to have been the first white man to cultivate tobacco. See POCAHONTAS.

ROLFE, WILLIAM JAMES (1827-1910), one of the greatest of American authorities on the life and works of Shakespeare, was born in Newburyport, Mass., and was graduated at Amherst College. After completing his college work he became head master of schools at Dorchester, Lawrence, Salem and Cambridge, and from 1904 to 1906 was president of Emerson College of Oratory, Boston. His first Shakespearean work appeared in 1867; among his productions are *Shakespeare the Boy*; *Life of Shakespeare*; *Shakespeare Proverbs*, and *Life of William Shakespeare*.

ROLLER, a strange Old World bird, named for its habit of tumbling in the air while flying and for tossing its food above its head and catching it on its descent.



ROMAN CATHOLIC CHURCH, that body of Christians which accepts the Pope as its visible head. Roman Catholics believe that the Church was established by Jesus Christ and committed to Saint Peter as the chief of the Apostles, to whom he gave the keys of the Kingdom of Heaven. They believe it to be the only Church of Christ, beyond whose pale there is no salvation. The word *pale*, however, according to Roman theology, includes

those of other Christian churches who understand and live in accordance with the precepts and teachings of Christ. The power bestowed by Christ upon Saint Peter is believed by Catholics to descend to his successors to the end of time, and is vested in the Pope as high pontiff of the Church.

Creed and Sacraments. The creed, or belief, of Catholics is defined in the Apostles' Creed, the Nicene, the Athanasian and, most minutely, in that of Pius IV, after the proclamation of the Council of Trent in 1562. The Church has seven sacraments, which are believed to impart spiritual grace, three of which can be taken advantage of but once namely, baptism, confirmation, and holy orders. The ceremonial of the mass is regarded as the most sacred and solemn in the ritual of the Church. In it Catholics believe that the body, blood, soul and divinity of Jesus Christ are really present in the bread and wine, and that this form of worship was ordained by Christ at his Last Supper with his Apostles and has continued to the present time.

Further Beliefs and Ceremonies. Catholics believe that Mary, the mother of Christ, can obtain for them innumerable spiritual benefits, if they appeal to her. They believe that in her conception she was immaculate. Notwithstanding the fact that divine worship is denied to her, she is honored beyond any of the other saints. Her invocation and that of the other saints is prescribed in the Creed of Pius IV, which also imposes reverence for images of them, such as statues or pictures. After the Virgin Mary, Saint Joseph is the most honored of all the saints.

A place of purification after death, known as purgatory, is also believed in by members of the Roman Church. Those dying penitent, but not wholly cleansed from sin, make full atonement in purgatory, after which they are admitted into heaven.

The Pope. The definition of the Church, as understood by Catholics, is a congregation of all the faithful under the supremacy of the Pope, who has been pronounced infallible. His infallibility, however, is limited to questions of doctrine and faith, which have been or would be defined by councils of the Church, composed of cardinals and other ecclesiastical hierarchs.

Priesthood. All entering the priesthood must assume the vow of celibacy before admission to holy orders, according to the law of the Western Church. There is, however, no apostolic obligation on the Church to impose celibacy as an indispensable qualification for the priesthood, but it is regarded as an important quality, since those in a married state would not give their attention wholly to spiritual duties. Gregory the Great and the Council of Toledo in 653 prohibited marriage by those in holy orders. Persons in minor orders, though married, were for centuries allowed to serve the Church. In the twelfth century minor priests at marriage were deprived of clerical privileges. Boniface VIII, in 1300, permitted them to act as clerks, provided they had the sanction of the bishop. The Council of Trent subsequently pronounced such marriages null and void. In the East, clerical celibacy existed in Thessaly, Achaia and Macedonia in the fifth century. When Synesius in 410 was elected bishop of Rome, he accepted the office only on the condition that he be allowed to live with his wife. The consequences of various laws on the question are that Greeks who aspire to the priesthood leave the seminaries and return for ordination after marriage; that secular priests can live in the married state, but on the death of a wife cannot take a second, and that bishops are chosen from the monks. All monks and nuns must be celibates.

Related Articles: Consult the following titles for additional information:

GENERAL

Abbot	Canon Law
Absolution	Canonization
Antipope	Capuchins
Archbishop	Cardinal
Ave Maria	Carthusians
Benedictines	Censor
Bishop	Charity, Sisters of
Breviary	Conclave
Bull	Concordat

Counter-Reformation	Mendicant Orders
Dominicans	Mercy, Sisters of
Eucharist	Missal
Franciscans	Monasticism
Hermits	Monk
Hierarchy	Nun
High Priest	Nuncio
Holy Water	Paulists
Holy Week	Penance
Index Expurgatorius	Pope
Indulgence	Priest
Innocents, Feast of	Purgatory
Holy	Rosary
Jesuits	Sacrament
Litany	Sacred College
Liturgy	Unction
Magnificat	Ursulines
Mass	Vatican Council

BIOGRAPHY

Ambrose, Saint	Manning, Henry
Aquinas, Saint Thomas	Edward
Augustine, Saint	Mercier, Honoré
Barbara, Saint	Merry del Val, Rafael
Becket, Thomas à	Mundelein, George W.
Begin, Louis Nazaire	Newman, John Henry
Bernard, Saint	Nicholas, Saint
Boniface, Saint	O'Connell, William H.
Cecilia, Saint	Patrick, Saint
Falconio, Diomedes	Ryan, Abram Joseph
Farley, John Murphy	Sebastian, Saint
Francis of Assisi	Tertullian
George, Saint	Theresa, Saint
Gibbons, James	Thomas à Kempis
Ignatius, Saint	Valentine, Saint
Ireland, John	Veronica, Saint
Lanfranc	Xavier, Francisco
Loyola, Saint Ignatius	
of	

ROMANCE, *ro mans'*, a fictitious narrative in prose or verse, the interest of which turns either upon marvelous or uncommon incidents. The name is derived from the class of languages in which such narratives in modern times were first widely known and circulated—the French, Italian and Spanish, called the *Romance languages*.

The ancient Greeks manifested great love for stories of adventure, which were the fore-runners of the modern romance. The most representative of these are the *Iliad* and the *Odyssey*. The earlier medieval romances of Western Europe were metrical and may be divided into two classes: the popular epics, chanted by strolling minstrels, and the more elaborate and artificial poems, composed and sung by the court poets. Both classes were based on more ancient lays, treating of celebrated heroes, frequently mingled with pagan myths and with connecting passages composed by the reciters. Thus originated a series of epics, grouped around some renowned hero and forming a cycle of romance.

The romances of French origin form a large and interesting body of literature, some attaining a length greater than 20,000 lines. These romances were sung by wandering minstrels to the sound of a kind of violin. Many of the reciters wrote their own chansons, others bought copies from the original composers. The romances of the Arthurian cycle owe

their origin to the lays of the Welsh bards, supposed to be as old as the sixth and seventh centuries, but they are directly based on the Latin *History* of Geoffrey of Monmouth, which was versified in French by Wace (1155–1158) and was amplified and translated into English by Layamon, about 1204. The Arthurian romance spread from France to Provence, Spain, Italy and the Netherlands, and was again transplanted into England. It is through Malory's *Morte d'Arthur* (1485), a prose version of the tales, that it came down to later times.

The favorite heroes of romance, besides Arthur, were Charlemagne, Roland, Alexander, Richard Lion-Heart and Guy of Warwick. In addition to romances dealing with these, we find also a class in which exploits of Teutonic heroes are celebrated, as the Anglo-Saxon or Anglo-Danish *Beowulf*, the old German *Nibelungenlied* and the romance of *Havelok the Dane*. The poetical romance was superseded by the prose romance, the transformation of metrical into prose romances being due in part to the invention of the art of printing, by which the necessity of meter for purpose of recital was done away with. The prose narratives, which, like those in verse, celebrated Arthur, Charlemagne, Amadis de Gaul and other heroes of chivalry, had a definite part in the development of the novel. See **NOVEL**.

ROMANCE LANGUAGES, the languages of Southern Europe which owe their origin to Latin. These languages were not based on literary Latin, such as is found in the classics, but on the everyday speech of the Romans; for it was the soldiers, tradesmen and artisans who carried the Roman language into the conquered territories of Rome. This Latin was much modified wherever it was introduced, and in time a new tongue grew up in each case where the Romans had grafted their language on native speech.

ROMAN LAW. See **CIVIL LAW**.

ROMAN LITERATURE. See **LITERATURE**, subhead *Latin Literature*.

ROMAN NUMERALS, the number symbols used for numbering the dials of clocks, the volumes in a set of books, the pages of prefaces and for various other purposes, are the symbols which were employed by the Romans in their arithmetical computations. The system is very simple, but it has for centuries been replaced by the Arabic, which is more convenient to write (see **ARITHMETIC**).

The system doubtless originated from counting on the fingers, as *I* for one, *II* for two, *III* for three, *IIII* for four. Then it became customary to write five with four vertical lines and a slant line across them. Probably from this device the use of *V* for five was evolved. Two *V*'s placed point to point form *X* the symbol for ten. *C*, the initial for *centum*, meaning *hundred*, stands for 100, *M*, the initial for *mille* one thousand, is the symbol for that number. *L* is the symbol for fifty and *D* for 500. The method of writing is simplified by subtraction. Instead of writing *IIII* for four, it is expressed by *IV*, the small number before the larger indicating that it is to be subtracted; thus we have *XL* for forty and *MCM* for 1900.

ROMANOFF, *ro'man awf*, the name of the family that ruled Russia from 1613 to 1917. Feodorovitch Romanoff, of the royal house of Rurik, was chosen by the half-barbarous nobles of Russia ruler of the country in 1613, and was given the title of *czar*. Nineteen Romanoffs in succession continued to rule Russia, until the last, Nicholas II, was deposed in 1917. Only two of this number won distinction by their statesmanship; these were Peter the Great, who found Russia almost disorganized and developed it into a strong nation, and Catherine the Great, who made her country respected in the courts of other nations.

The other rulers pursued a narrow policy that shut Russia from the rest of the world. Under them Russia was ruled by autocratic officials who oppressed the people and stamped out with utmost cruelty any attempt on part of the common people to have a voice in the government. Their influence was so strong that no legislative body was tolerated until early in the twentieth century, and then for several years it was not permitted to exercise any power. But the people were gradually gaining political strength, and finally, exasperated over conditions brought about by the World War, on March 15, 1917, the Duma, or Russian national legislative assembly, compelled Czar Nicholas II to abdicate. He named his brother Michael his successor, but the latter refused to assume the responsibility unless it was the people's will, and the rule of the Romanoffs came to an end.

The members of the Imperial family were imprisoned in the Tsarkoe-Selo Palace. Later they were removed by the Bolshevik government to Tobolsk, Siberia, then to Ekaterin-

burg, where the ex-czar was executed by order of the Bolsheviks, probably on June 16, 1918. See NICHOLAS II.

RO'MANS, *EPISTLE TO THE*, the most elaborate and important letter of Paul the Apostle. It was written at Corinth, A. D. 57 or 58, and expressed Paul's desire to visit Rome. The burden of the letter was the Apostle's doctrine of justification by faith, through which he showed how the Christian dispensation was extended alike to Jews and Gentiles. This doctrine was accepted by Luther as the foundation of his system, and it is one of the most important articles in the creeds of Protestant Churches.

ROMANTICISM, *ro man'ti siz'm*, in the literature of Western Europe, the name given a movement having for its purpose the rise and development of imagination and sensibility in both the prose and poetry. Romanticism indicated the tendency of nineteenth-century authors to free literature from the Greek and Roman formalism which had for many years considered form of greater importance than thought and sentiment. At the beginning of the movement Pope was considered the greatest English poet, because of the correctness of his verse. James Thompson in 1727-1730 published his *Seasons*, in which for the first time attention was given to nature. This poem may be considered as the first to attract attention to the new movement.

Gray's *Elegy*, Goldsmith's *Deserted Village* and Cowper's *Task* gave impetus to the movement, which later reached its height in Scott, Byron, Shelley, Keats, Wordsworth, Coleridge and Burns. In Germany the leaders in the opposition to classic ideals in literature were Lessing and Herder; Goethe's *Sorrows of Werther* is one of the extreme products of the movement. But the name *Romantic School* is usually given in Germany to the group of which the chief members were the brothers Schlegel, Novalis, Tieck, Schelling and Schleiermacher. Victor Hugo, by the publication of his *Odes and Ballads*, in 1826, and of his *Cromwell*, shortly afterward became the leader of the romantic movement in France.

ROMAN WALLS, walls constructed by the Romans, on the northern boundary of Britain, to protect the country from incursions of the Picts and Scots. The Wall of Hadrian, built A. D. 120, extended between the Tyne and the Solway. The wall was strengthened

by Severus, and is often called the Wall of Severus. The Wall of Antoninus, built in 139, extended between the Forth and the Clyde rivers. It marked the northern boundary of Roman dominion. Portions of these walls are still in a good state of preservation.



ROME, the capital of the modern kingdom of Italy, a city possessing glorious traditions and a history reaching far back into antiquity. Over seven centuries before Christ, so the story goes, a settlement was made on one of seven hills extending along the left bank of the Tiber River, about fifteen miles from the sea. In course of time the neighboring elevations were peopled, and eventually the settlements united to form the Rome of history, a city great and powerful, ruling the world from its seven hills. The Rome of to-day is a religious center of the Western Christendom and the residence of the Pope, and in many respects it is like other modern cities. Yet its wonderful ruins, a priceless heritage from the past, are ever there to suggest the city of the ancient republic and the world empire.

Ancient Rome. During the many hundred years of Rome's existence its appearance and condition changed repeatedly, but it is best known as it appeared during the reign of Emperor Augustus, when it was at the height of its splendor. Of this ruler it was said that he "found a city of wood and left one of marble." The streets were crooked and narrow, but splendid public buildings, such as temples, porticoes, theaters and baths, gave parts of it an appearance of wonderful beauty. At that time the population is supposed to have been more than a million, and in the time of Trajan it was not far short of two million.

Ancient Rome was surrounded by high walls, the Tiber was spanned by eight or nine bridges, and within the walls were open places, or parks, covered with grass and trees. Several paved spaces, surrounded by imposing buildings, were the places of public meeting, and of such the *Forum Romanorum*, which lay between the Capitoline and

Palatine hills, was chief, although the Forum of Trajan was more splendid. The central street of the city was the *Via Sacra*, or Sacred Way, which, beginning at the base of the Capitoline Hill, ran along the Forum by the Colosseum and to the space between the Esquiline and Caelian hills. The two principal roads leading out of Rome were the Flaminian Way, or Great North Road, and the Appian Way, or Great South Road. The oldest and most sacred temple was that of Jupiter Capitolinus, on the Capitoline Hill. The Pantheon, a temple of various gods, was a great circular building with a dome roof, 140 feet wide and 140 feet high. It was a marvel of construction, and so well was the work done that the Pantheon is still in excellent preservation.

Other temples built at various times were the white marble Temple of Apollo, on the Palatine; the Temple of Minerva, which Pompey built and which Augustus covered with bronze; the Temple of Peace, once the richest and most beautiful in Rome; the Temple of the Sun, and the magnificent Temple of Venus, which Caesar caused to be built to her. The principal imperial palaces were on the Palatine Hill. The most magnificent of the amphitheaters was that of Titus, completed in A. D. 80, and now known as the Colosseum. The Circus Maximus, between the Palatine and the Aventine, and the theaters of Pompey and Marcellus, were all celebrated for their size and elegance. The public baths of Rome were numerous, and some of them were enormous buildings, splendidly decorated and furnished. Extensive ruins of the baths of Caracalla and of Diocletian still remain and testify to the luxury with which the pleasure-loving Romans surrounded themselves.

Rome was decorated with triumphal arches and beautiful columns, built at various times. In the corner of the Forum may still be seen the great Arch of Septimius Severus; at the other end is the beautiful Arch of Titus, and nearer the Colosseum is the well-preserved Arch of Constantine. Trajan's beautiful pillar, 117 feet high, still stands among the ruins of his Forum. A spiral panel, running from top to bottom, shows in relief the triumphs of Trajan, and furnishes to modern scholars the best illustrations of the costumes and habits of the epoch. Within, a flight of stairs gives access to the top of the pillar. Magnificent tombs were located here

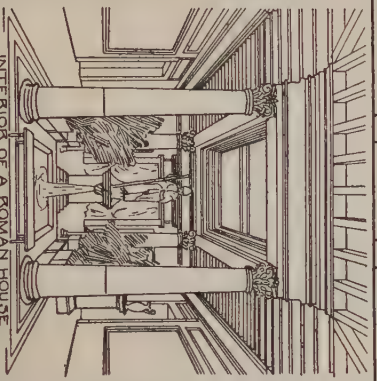
ROME

"The Eternal City"



PLAN OF ANCIENT ROME

- 1 Capitoline Hill
- 2 Arx
- 3 Comitium
- 4 Mamertine Prison
- 5 Via Sacra
- 6 Via Triumphalis
- 7 Palaces of the Caesars
- 8 Colosseum
- 9 Atrium
- 10 Hadrian's Tomb
- 11 Circus Maximus
- 12 Forum

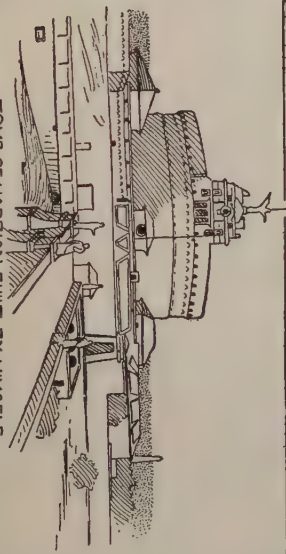


INTERIOR OF A ROMAN HOUSE

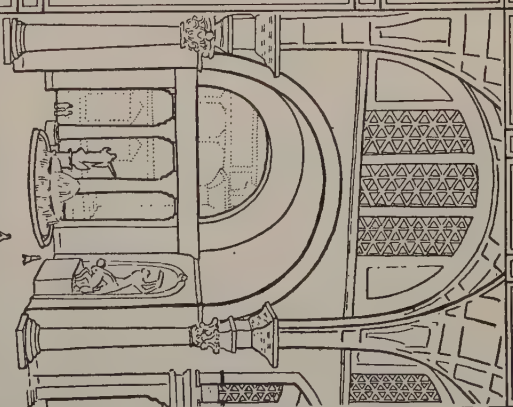


PLAN OF THE ROMAN FORUM AND THE SURROUNDING BUILDINGS

- 1 Mamertine Prison
- 2 Temple of Vespasian
- 3 Temple of Saturn
- 4 Basilica Julia
- 5 Column of Phocas
- 6 Temple of Julius Caesar
- 7 Temple of Antoninus and Faustina
- 8 Cloaca Maxima
- 9 Temple of Venus

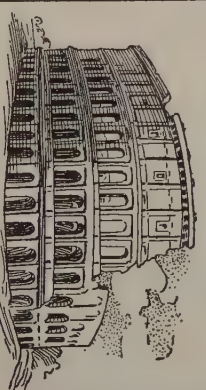


TOMB OF HADRIAN, BUILT BY HIMSELF



BATHS OF CARACALLA

A most magnificent building nearly one mile around. Accommodations for 1600 bathers.



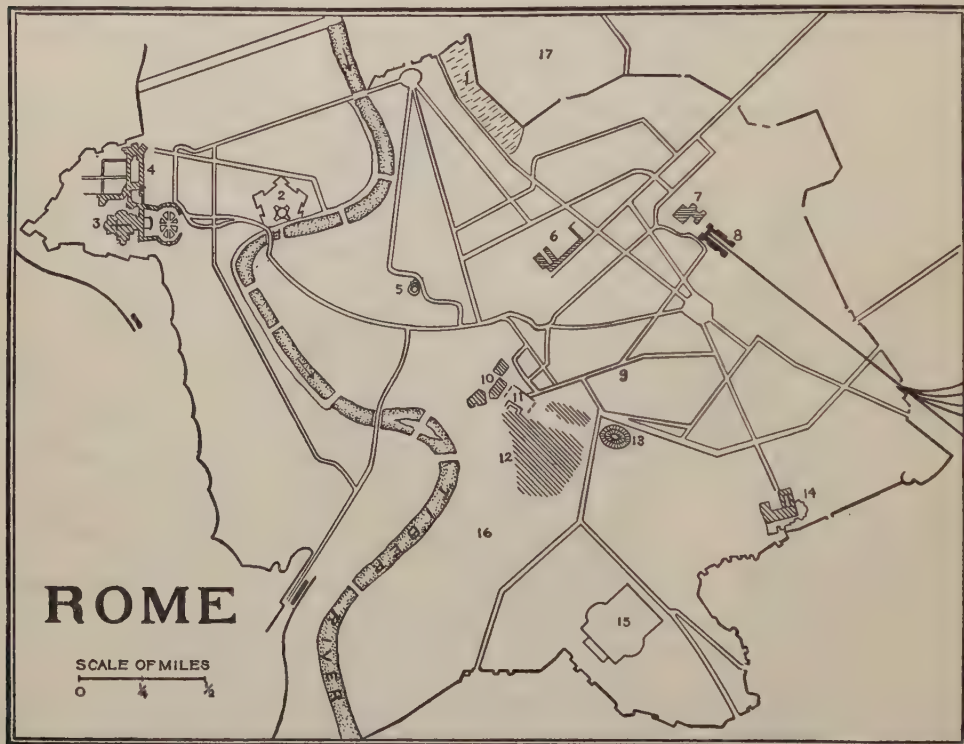
THE COLOSSEUM

and there throughout the city, chief among which were the Mausoleum of Augustus and the noble tomb of Hadrian, still standing on the west bank of the river and known as the Castle of Saint Angelo. Only passing mention can be made of the rich private dwellings of the nobility, crowded with treasures of art, which ornamented the more favored parts of the city.

Modern Rome. Since Rome became the capital of modern Italy it has been improved

stone embankments keep the treacherous stream within its banks and prevent the lower parts of the city from being flooded, as they were in former times.

Among the principal squares of modern Rome is the Piazza del Popolo, on the north side of the city, near the Tiber, from which the three principal streets of the city diverge. Another street crossing the river leads to the Vatican and the Church of Saint Peter's, which occupy conspicuous positions on the



1, Pincian Hill; 2, Hadrian's Tomb; 3, Saint Peter's; 4, Vatican; 5, Pantheon; 6, Quirinal (Royal Palace); 7, Baths of Diocletian; 8, Railway Terminal; 9, Column of Trajan; 10, Capitol; 11, Forum; 12, Palatine Hill; 13, Colosseum; 14, Lateran; 15, Baths of Caracalla; 16, Aventine; 17, Villa Borghese.

in cleanliness and general healthfulness; it has been given excellent systems of electric railways, wide new streets and whole sections of fine modern buildings, so that it is an attractive city, aside from its historical associations. The city is surrounded by a wall and is entered by twelve gates and several openings through which railways pass. The wall on the east bank occupies the lines laid down by Aurelian in the third century, but the west wall was not built until the seventeenth century. There are ten fine bridges across the Tiber within the city, and great

hills. The Quirinal, or the king's palace, is situated on an eminence near the center of the city. The Capitoline Hill is still crowned by the Capitol and two large museums on the sides of a little central court, in which is the equestrian statue of Marcus Aurelius. The appearance of the hill, however, has been much changed of late by the erection of a great monument to Victor Emmanuel. The Palatine Hill is a mass of ruins which, with the territory immediately surrounding it, is still the subject of continued excavations, which are from time to time revealing re-

markable remains of ancient Roman splendor. The Forum has been excavated and contains many fragments that show the beauty of its statuary and other decorations. Rome is filled with beautiful churches, of which the greatest are the Church of Saint Peter's and the Cathedral of Saint John in Lateran, the latter in an isolated locality near the south wall of the city. There are beautiful parks and fine drives through the city, especially on the Janiculum, a hill extending along the west bank of the river. The Pincian Hill, near the Piazza del Popolo, is laid out with gardens and beautiful drives, and is a favorite afternoon resort.

Outside the walls near by are the Borghese gardens and the palace, celebrated for its picture gallery. Other private palaces within the city contain fine collections of paintings, most of which have been secured by the Italian government. Public museums and picture galleries are numerous, and in them are guarded the treasures of art from early times to the present. Among them the Vatican may be considered the greatest, with its unrivaled collections of statuary and paintings, but the Capitoline Museum contains some of the most famous statuary of the world.

Educational institutions abound, among which the University of Rome ranks first. The *Collegio Romano*, formerly a Jesuit college; the *Collegio de Propaganda Fide*, an establishment where Roman Catholic missionaries are trained; the American School of Classic Languages, and several other institutions for training in art, science and literature register numerous students. There are several great libraries, modern theaters, hospitals and other public and charitable institutions, such as are found in most cities, though all are more or less affected by the historic importance of the city and the fact that it is the center of interest for travelers the world over. This affects also the trade of the city, which is externally unimportant, as the river can be navigated only by small craft, while railway facilities are limited. However, woolen and silk goods, artificial flowers, jewelry, earthenware and objects of art are manufactured, and trade in these is considerable.

From the downfall of the Roman Empire, the history of Rome is included in that of the Papacy. In 1527 the city was captured and sacked by the troops of the Constable of

Bourbon; in 1798 it was occupied by the French; in 1848 Pius IX was driven from Rome and a Roman republic was formed, under Mazzini and Garibaldi. A French army sent to the Pope's assistance captured Rome in July, 1849, and under the protection of the French, the Pope ruled until October, 1870, when Rome was occupied by the Italian troops. In June, 1871, the "Eternal City" became the capital of United Italy, and the king took up his residence in the Quirinal. Population, 1911, 542,123; in 1920, 590,960.

Related Articles. For description of important structures of ancient and modern Rome consult the following titles:

Appian Way	Pantheon
Arch	Saint Peter's Church
Campus Martius	Septimius Severus,
Capitol	Arch of
Caracalla, subhead	Titus, subhead Arch of
Baths of Caracalla	Titus
Circus	Trajan, subheads Arch
Colosseum	of Trajan; Trajan's
Forum	Column
Lateran	Vatican



Arch of Titus

ROME, HISTORY OF. The origin of Rome is connected in legend with the Trojan War, through Aeneas, who was led by the will of the gods to Italy. His son Ascanius founded Alba Longa, which placed itself at the head of the league of Latin cities. About 400 years after the founding of the city, Romulus and Remus, the grandsons of Numitor, king of Alba Longa, founded a new city on the Palatine, one of the seven hills on the left bank of the Tiber (753 B. C.). In a quarrel over the name and government of the city, Remus was slain by his brother, who became the first king of Rome. To hasten the growth of his new city, Romulus made it a place of refuge, to which he invited the lawless and discontented from the surrounding country. As neighboring tribes refused to allow their women to marry the Romans, Romulus secured wives for them by the so-called *rape of the Sabines*. The war with the Sabines, to which this led, was ended by the intercession of the women, and the Romans and Sabines united to form a single nation.

Period of the Kings. In prehistoric Italy there were numerous tribes, the most important of which were the Latins. Rome subdued the less important cities of Latium one after

another, and the inhabitants moved to Rome, where they formed the plebeian class, which was without political rights. At the head of the government of Rome was the king, who was elected by the people, and next to him was the Senate, composed of three hundred members. A popular assembly, which included the heads of all the families, had the right to make laws, decide upon peace and war and confirm the election of the king. Tradition gives as the names of the kings of Rome who succeeded Romulus; Numa Pompilius, Tullus Hostilius, Ancus Martius, Tarquinius Priscus, Servius Tullius and Tarquinius Superbus, the last of whom reigned until 509 B. C. The period of the kings was occupied largely with contests between the patricians and plebeians, as a result of which the latter gained certain privileges. The last king, Tarquinius Superbus, by his acts of oppression so angered the people that they rose against him and drove him from the state, declaring that henceforth the supreme power should be held by no one for life. Rome was declared a republic, and at the head of the new government were placed two magistrates, called consuls, chosen for one year and possessing powers which were almost identical with those of the early kings.

Republic Formed. The first two or three hundred years of the Republic were marked by bitter contests between the patricians and plebeians. The first step toward equality and protection for the plebeians against the patricians was the creation in 494 of the office of tribune, which the plebeians secured by withdrawing from the city and refusing to return until concessions were granted. Another demand which the plebeians made was that the laws, which hitherto had not been written down, should be codified and put in such a form that any one might acquaint himself with them. The result of this was the appointment of the decemvirs and the preparation of the Law of the Twelve Tables, upon which all subsequent Roman jurisprudence was based. A law legalizing intermarriage between the plebeians and patricians equalized the two orders socially, and the demand of the lower class for admission to the consulship resulted in a compromise—the election of military tribunes, with consular power, who might be from either order. Of the questors, who were first elected in 447, it was provided that two might be plebeians, and in 367 the *Licinian Law* not

only admitted plebeians to the consulship, but declared that one of the consuls must be a plebeian. To offset this advantage, the patricians secured the new office of praetor, but the praetorship also was soon opened to the plebeians.

Early Wars. Externally this period was marked by numerous wars. The neighboring tribes, which had made treaties with the king of Rome, regarded their allegiance as ended by his expulsion, and certain Etruscan tribes, with Lars Porsena of Clusium at their head, aided Tarquin in his vain attempts to recover his throne. Chief of the wars in which Rome engaged against the neighboring tribes were those against the Veientes, the Volscians and the Aequians. In 390 B. C. the Gauls under Brennus invaded Roman territory from Northern Italy and captured Rome, which they plundered and burned, but failed to take the citadel, which was heroically defended by Manlius for seven months.

In its progress southward, Rome came into collision with the Samnites, and a contest for the mastery of Italy began which lasted for over fifty years (343–290), with occasional interruptions. In spite of some defeats, the Romans were ultimately successful, and firmly established their supremacy over the Samnites. Rome's progress in the East was opposed by the Tarentines, who called to their aid Pyrrhus, king of Epirus. Pyrrhus was in the end defeated and compelled to leave Italy, and the supremacy of Rome in Southern Italy was secured.

The Punic Wars. Rome next came into collision with Carthage, the most powerful foe thus far encountered. The two peoples had had a treaty of alliance since 348, but it was of little significance, and the jealousy with which each viewed the progress of the other grew, until in 264 B. C., on a slight pretext, war was declared. Between the close of the first Punic War (241) and the outbreak of the second (218), both Rome and Carthage were busy strengthening their resources. The final result, however, was the same as that of the first war, and Carthage lost to Rome all its colonies and was obliged to pay a large annual tribute.

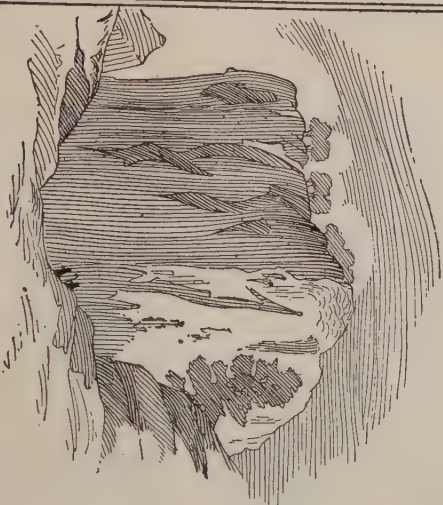
Conquest of Greece and Spain. Rome's next wars of conquest were in the East. The first Macedonian War (214–205) accomplished little, as Rome was at the time engaged in the struggle with Carthage, but the second ended with the complete defeat at



ROME

The Legendary Period 753-509 B.C.

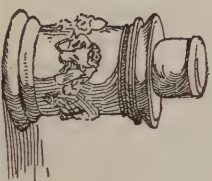
CHRONOLOGICAL SUMMARY	
Founding of Rome, about.....	753 B.C.
Numa Pompilius.....	716
Tullus Hostilius.....	672
Ancus Marcius.....	640
Lucius Tarquinius.....	616
Servius Tullius.....	578
Tarquinius Superbus.....	534
Expulsion of the Kings.....	509



THE TARPEIAN ROCK
(FROM AN OLD PRINT)



PART OF THE WALL OF ROME
SAID TO HAVE BEEN BUILT BY ROMULUS



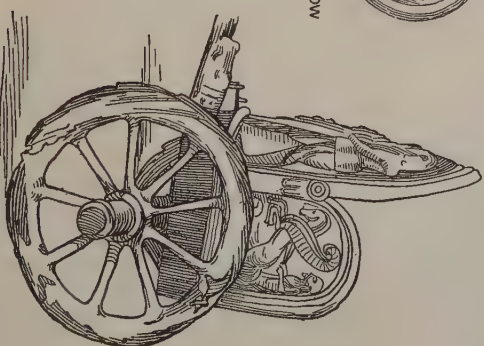
ROMAN DOMESTIC ALTAR



COIN
SHOWING PROW
OF SHIP



A VESTAL VIRGIN



ROMAN CHARIOT OF THE
SEVENTH CENTURY B.C.

Cynoscephalae, in 197 B. C., of Philip V of Macedon. In 172 the Greeks united under Perseus, the new king of Macedonia, and the third Macedonian War followed, which was ended by the decisive victory of the Romans at Pydna (168). Twenty years later the Achaean League attempted a revolt, and Roman armies promptly marched into Greece, put down the rising and converted Greece into a Roman province (146 B. C.).^{*} This same year marks the close of the third Punic War (149-146), which consisted merely in the siege and heroic defense of Carthage. The splendid city was destroyed, and Africa became a Roman province. In Spain an obstinate war had been carried on by the Celtiberians, but the country was finally subdued in 133.

Decline of the Republic. The last century of the Roman Republic was marked by incessant civil dissensions. In spite of the nominal equality in the civil and political rights of the two orders, the government was exclusively in the hands of the nobility, and the Senate ruled with almost sovereign power. Attempts were made to better the condition of the plebeians, but little was accomplished. From the death of the younger Gracchus, in 121, a corrupt aristocratic government ruled. The honor of the Roman state had sunk so low that when Jugurtha, king of Numidia, revolted and usurped the neighboring territory, which was under the Roman protectorate, the commissioners sent to investigate and the army dispatched to subdue him were readily won over to his side by bribes. At length, however, the war against Jugurtha was taken up and brought to a successful close by Caius Marius (106).

Rome was now threatened from the north by two Germanic nations, the Cimbri and the Teutones, and this danger also Marius averted. In 91 B. C. began a fierce struggle known as the Social War, in which the Latins and the various Italian peoples contended for the rights of Roman citizenship, which belonged only to the inhabitants of the capital and of Roman colonies. Although generally victorious, Rome wisely ended the strife by granting the privileges demanded. In this Social War, Marius and Sulla fought side by side, but jealousy between them was constantly growing, and when, in 88, Sulla was chosen as a leader in the war against Mithridates, king of Pontus, the result was civil war. The war with Mithridates was a long

and stubborn contest, but it was finally brought to a close in 65 B. C. by the defeat of Mithridates by Pompey. The Catiline conspiracy, which broke out in Rome in 63 B. C., was put down only by the vigilance and genius of Cicero.

For the next twenty years, the history of Rome is the biography of the men who in 60 B. C. formed the famous first triumvirate—Caesar, Pompey and Crassus. After the death of Caesar, his assassins did not receive the public approval which they had expected, and the chief power of the state fell into the hands of Mark Antony. After several years of struggle, a second triumvirate was formed, consisting of Octavius, Antony and Lepidus. When his rivals were removed, Octavius was able to establish under republican forms an absolute and perfect monarchy. In 29 B. C. he received the supreme power for life.

The Empire. During the first 200 years of the Empire, the forms of constitutional government were generally observed. The oppression of occasional tyrants, as Tiberius and Nero, affected chiefly the capital, the provinces being usually unmolested and well governed. Tiberius (14-37) first ruled with wisdom and moderation, but afterward became suspicious, cruel and tyrannical. During this reign occurred the preaching and crucifixion of Jesus Christ. Tiberius was followed by three other emperors of the Claudian house, Caligula (37-41), Claudius (41-54) and Nero (54-68). One of the most important events during this period was the conquest of Britain, during the reign of Claudius. Under Nero occurred the burning of Rome, which was followed by a cruel persecution of the Christians.

After the three short reigns (68-69) of Galba, Otho and Vitellius, the favorite commander Vespasian (69-79) was chosen emperor. His reign and that of his son Titus (79-81) were notably prosperous and free from tyranny. It was during the reign of Titus that the eruption of Vesuvius occurred, by which Pompeii and Herculaneum were destroyed. Diocletian (81-96), the last of the twelve Cæsars, was followed by the "five good emperors," Nerva, Trajan, Hadrian, Antoninus Pius and Marcus Aurelius, whose reigns were happy and prosperous. Under Trajan, the Roman Empire extended its boundaries to the farthest limits attained in its history. Hadrian, realizing that the Em-



ROMAN DOMINION (IN BLACK)
B.C.

ROME

The Republic

509-31 B.C.

•CHRONOLOGICAL SUMMARY•	
	B.C.
Republic Established.....	509
Sack of Rome by the Gauls.....	390
The Samnite Wars.....	343-290
The Punic Wars.....	264-146
The Macedonian Wars.....	215-168
The Mithridatic Wars.....	88-63
Julius Caesar.....	59-44
Battle of Philippi.....	42
Battle of Actium.....	31



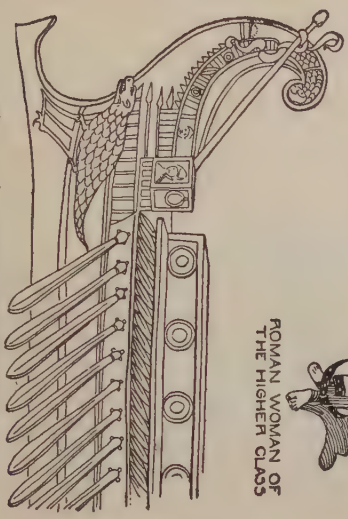
POMPEY THE GREAT



ROMAN WOMAN OF
THE HIGHER CLASS



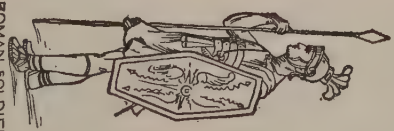
THE
APPIAN
WAY
(AS IT APPEARS TODAY)



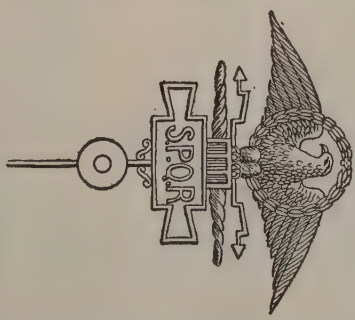
PROW OF A ROMAN WAR SHIP



JULIUS CAESAR



A ROMAN SOLDIER



THE ROMAN STANDARD.
INSCRIPTION MEANS
"THE SENATE AND ROMAN PEOPLE."



DENARIUS OF CAESAR
(SILVER)



pire was in danger if its boundaries were extended too far, relinquished the contests which Trajan had made beyond the Danube and beyond the Euphrates. Under Marcus Aurelius occurred the conflict with the Marcomanni, which marked the beginning of the long and desperate struggle of Rome with the German tribes.

With the reign of Commodus (180-192) began the decline of the Roman Empire. This was at first gradual, but incompetent rulers and invincible hordes of barbarians hastened the inevitable fall. Under Septimius Severus (193-211) occurred a change in the attitude of the imperial government toward Christianity, and under his protection this religion began to make rapid progress throughout Roman dominions. Alexander Severus (222-235) gave Rome an able government and sought to check the military supremacy and corrupt tendencies of the time. The period of anarchy (251-268), during which various claimants to the imperial dignity were constantly warring among themselves, seemed about to cause the dissolution of the Empire, but it was saved for a time by the succession of five good emperors, Claudius, Aurelian, Tacitus, Probus and Carus. Of these the most famous is Aurelian (270-275).

With the reign of Diocletian (284-305), the last trace of republicanism vanished, and Rome became an absolute monarchy. This saved the Empire for nearly 200 years more, although the appointment of Maximian to the post of joint emperor began the division of government administration which finally resulted in the separation of East and West. Diocletian is remembered for his terrible persecution of the Christians. This was the last pagan persecution of the Church, for under Constantine the Great (sole emperor, 323-337), Christianity became the state religion. In 330 the capital of the Empire was moved to Byzantium, afterward Constantinople. The division of the Empire among Constantine's sons led to a struggle which lasted till 350, when Constantius became sole emperor. He was succeeded by Julian the Apostate (361-363), so called because of his efforts to restore paganism.

In the reigns of the joint emperors, Valentinian and Valens, the barbarian tribes on the north again became threatening, while in Africa the Moors, and in Britain the Scots and Picts, almost destroyed the Roman suprem-

acy. In 376, after the death of Valentinian, the Visigoths, fleeing from the Huns, were allowed by Valens, who still ruled in the East, to cross the Danube and settle as allies. The agents of the government exasperated them by unfair dealing, and the result was a battle in which the Romans were defeated (378); but under Theodosius the Great (379-395) the Romans succeeded in subduing the Goths.

At the death of Theodosius, the Empire was divided between his sons, Arcadius and Honorius, the latter receiving the West, the former becoming ruler of the Byzantine Empire. Between the East and West, jealousy arose, and one power often saved itself from the barbarians by inducing them to turn their hordes against the other. The Goths under Alaric were defeated by Stilicho, the general of Honorius, first in Greece and later in Italy, but after the death of Stilicho they returned and captured and sacked Rome. Meanwhile, in the provinces, the Roman rule had ended with the withdrawal of the legions to defend Italy. The Visigoths founded a kingdom in Southern France and Spain, and the Vandals took possession of Northern Africa. When the Huns, under Attila, appeared, and after exacting tribute from the Eastern emperor, descended upon Gaul, the united Roman and Gothic armies opposed them at Châlons and defeated them (451). The following year, Attila marched into Italy and threatened Rome, but was induced by the pleas of Leo the Great, the Christian bishop, to spare the city. In 455 the Vandals under Genseric captured the city and plundered it for two weeks. Between 456 and 472 Count Ricimer created and deposed emperors at will.

The last of the Roman emperors, strangely enough, bore the name of Romulus, but was surnamed Augustulus. In 476 Odoacer de-throned this child emperor and took the title of king of Italy; he thus brought the Roman Empire in the West to an end. Rome now became a province of the Byzantine empire and was ruled in theory, sometimes in fact, from Constantinople, until, in 800, the crown of the Western Empire was placed on the head of Charlemagne.

Related Articles. Consult the following titles for additional information:

HISTORICAL TOPICS

Agrarian Laws	Cimbri
Atrium	Comitia
Augurs	Consul
Byzantine Empire	Decemvirs
Carthage	Etruria
Censors	Fasces

Gladiator	Quirinal
Goths	Sabines
Helvetii	Samnites
Huns	Saturnalia
Legion	Tarpeian Rock
Lictors	Tiber
Lupercalia	Toga
Patrician	Tribune
Plebeians	Triumph
Prætor	Triumvirate
Prætorian Guard	Twelve Tables, Law of
Punic Wars	the
Quæstor	

BIOGRAPHY

Agricola, Gnaeus J.	Justinian I
Antony, Mark	Lepidus, Marcus A.
Augustus	Lucretia
Aurelian, Lucius	Marius, Caius
Aurelius, Marcus	Mithridates
Brutus, Decimus	Nero
Brutus, Marcus	Nerva
Caesar, Caius Julius	Numa Pompilius
Caligula	Pompey
Catiline	Pyrrhus
Cato, Marcus Porcius	Romulus
Cicero, Marcus Tullius	Scipio, Publius C.
Cincinnatus, Lucius	(father and son)
Claudius	Seneca, Lucius A.
Cleopatra	Servius, Tullius
Constantine	Sulla, Lucius C.
Crassus, Marcus L.	Tarquinius, Lucius
Diocletian	Theodoric
Domitian	Theodosius
Galba, Servius	Tiberius
Gracchus	Titus
Hadrian	Trajan
Hamlicar Barca	Valens
Hannibal	Valentinian I
Jugurtha	Valentinian III
Julian	Vespasian

LITERARY REFERENCES

Aeneid	Plautus
Caesar, Caius Julius	Pliny
Cicero, Marcus Tullius	Quintilian
Horace	Tacitus, P. C.
Justinian I	Terence
Livy	Vergil

ROME, GA., the county seat of Floyd County, seventy-two miles northwest of Atlanta, on the Oostanaula and Etowah rivers, where they unite to form the Coosta, and on the Central of Georgia, the Nashville, Chattanooga & Saint Louis, the Western & Atlantic, the Rome & Northern and several lines of the Southern Railroad. It is one of the growing industrial cities of the South, and it contains cotton and hosiery mills, machine shops, an iron furnace, planing mills, a furniture factory, a tannery and various other establishments. There is also a large trade in cotton, and there are manufactories of cottonseed oil. The city has a Federal building, a county courthouse, Mobley Park and eight steel bridges across the rivers. It is the seat of Shorter College for Women, and it also has the Hearn Institute and Everett Springs Seminary. The place was chartered as a city in 1847. The commission form of government was adopted in 1915. Population, 1910, 12,099; in 1920, 13,252.

ROME, N. Y., in Oneida County, fifteen miles northwest of Utica, at the junction of the Erie, Barge and Black River canals, on the Mohawk River and on the New York,

Ontario & Western and several lines of the New York Central railroad. It is in a dairy-ing and farming region, producing considerable cheese, butter and hops. There are manufactures of steel rails, locomotives, brass and copper goods, electrical goods, soap, wire and textiles. The principal institutions include the state custodian asylum for the insane, a state institution for deaf-mutes, Saint Aloysius Academy, the Jervis Library, Y. M. C. A., Academy of the Holy Name, Rome Free Academy, three hospitals and a Federal building. Fort Stanwix was built on the site of the present city in 1758, and near here several battles of the Revolution were fought. Rome was incorporated as a town in 1796 and as a city in 1870. Population, 1910, 20,497; in 1920, 26,341.

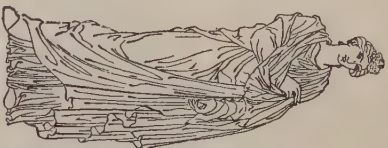
ROMEO AND JULIET, *ro'meo and joo'-li et*, one of Shakespeare's tragedies. It was first printed in 1597, and was followed by a corrected edition two years later. The direct source of the plot is credited to an English poem, the *Tragicall Historye of Romeus and Juliet*, written by Arthur Brooke in 1562, although the theme with many adaptations was extant as far back as 1591. The story, which has no historical foundation, concerns itself with the love of Romeo, of the house of Montague, and Juliet, of the house of Capulet. Between these two families a hatred was carried from generation to generation, and only over the dead bodies of the two lovers was the enmity cast aside and a reconciliation effected.

The rôle of the central figures has been a favorite of many actors and actresses of note. Bellini and Gounod each made the tragedy the subject of an opera, Galli-Curci scoring one of her great triumphs in the Gounod rendition. The subject also inspired the Berlioz dramatic symphony.

ROMULUS, the mythical founder and first king of Rome, was the son of Silvia, the daughter of Numitor, king of Alba. By the god Mars she became the mother of the twins Romulus and Remus. Their uncle, Amulius, who had driven Numitor from his throne, ordered the twins to be set afloat in a basket on the Tiber. The basket, according to the story, was stranded beneath a fig tree, at the foot of the Palatine Hill, and the boys were suckled by a she-wolf and fed by a woodpecker, until they were accidentally found by Faustus, the king's herdsman, who took them home and educated them.



BREAD SHOP



ROMAN MATRON
From a Statue in the
Vatican



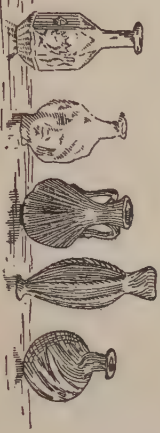
COURTYARD FOUNTAIN



SEAL RING



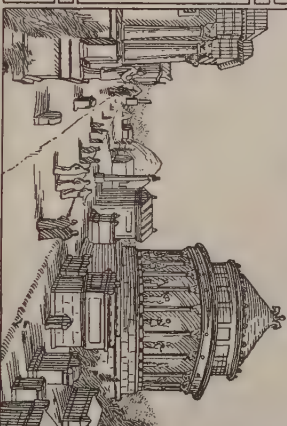
WATER BOTTLE



GLASSWARE

ROME

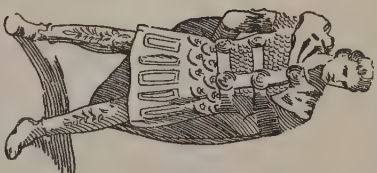
Social Customs and Manners



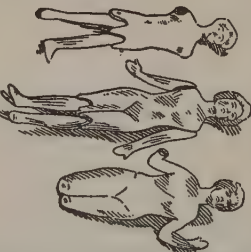
TOMBS ALONG THE APPIAN WAY

SOCIAL CUSTOMS

- | | |
|------------------|--------------|
| HOMES | MARRIAGE |
| Architecture | Preparation |
| Family Life | Ceremony |
| Social Life | Dress |
| Games | Distinctions |
| SLAVERY | The Toga |
| Origin | The Tunic |
| Influence | DEATH |
| Number of Slaves | Funerals |
| How Employed | Ceremonies |



CENTURION, IN
STREET COSTUME



DOLLS



CISTERN



SPOONS



CHAIRS AND TABLE

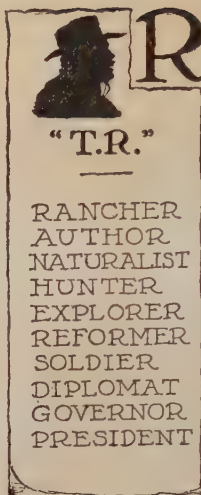
When they had grown up and become aware of their parentage, they organized a band of enterprising comrades, by whose help they deposed Amulius and reinstated Numitor on his throne. They next resolved to found a city, but as they disagreed as to the best site for it, they resolved to consult the omens. The decision was in favor of Romulus, who immediately began to raise the walls. Remus, who resented his defeat, leaped over the rude rampart in scorn, crying, "Thus will the enemy do," whereupon Romulus slew him, saying, "So perish all who in the future shall cross these walls."

Romulus soon attracted a considerable number of men to his new city, by making it a place of refuge for every outlaw or broken man.

Since surrounding tribes would not allow their daughters to marry the Romans, whom they looked upon as outlaws, the founders of the new city stole their wives from the Sabines. This led to a war, which was, however, ended at the entreaties of the Sabine wives, and from that time Romulus and the Sabine king ruled side by side. Romulus is said to have miraculously disappeared in a thunderstorm, carried off, according to the popular belief, by his father, Mars. The date of the founding of Rome was usually given as 753 B. C., and that of the death of Romulus, as 716 B. C. See **ROME**.

ROOK, a European bird of the crow family. In habit it is somewhat like the crow and the magpie, but differs from all other birds of this group in that it feeds entirely on grains and insects, has purplish plumage and sheds its face feathers on maturity. The most northern birds migrate in winter. Rooks nest in great colonies called rookeries. They are sometimes caught and tamed.

ROOKWOOD POTTERY, a ceramic ware manufactured in Rookwood, a suburb of Cincinnati, of American clays and by American methods. The experiment was begun in 1880 by Mrs. Bellamy Storer, and has been eminently successful, resulting in some of the most beautiful modern pottery. Most Rookwood pottery has a distinctive sea-green tone. It is made in original designs and is finished as cameo, dull-finished or richly-glazed ware. It is made almost entirely without machine operations, each piece passing through the hands of about twenty-five persons on its way from the clay-mixing process to the kiln.



RANCHER
AUTHOR
NATURALIST
HUNTER
EXPLORER
REFORMER
SOLDIER
DIPLOMAT
GOVERNOR
PRESIDENT

ROOSEVELT, *ro'zeh velt*, THEODORE (1858-1919), the twenty-sixth President of the United States. His death, on January 6, 1919, brought to a close one of the most useful, interesting and active careers in American history. For nearly two decades Theodore Roosevelt had been a vital figure in the life of the nation; a storm center of political thought; a clear and definite voice on all subjects which affected his fellowmen. He was not only a statesman and political

leader, but a reformer, traveler, writer, naturalist, bookman and athlete. Whatever interested humanity interested him, and he was no less vigorous in his utterances on such subjects as race suicide and "molycoddles" than on issues of international politics.

Like all men who speak and act with decision, he had bitter enemies as well as enthusiastic friends, but without doubt he will go down in history as the outstanding figure in the political and economic movement that transformed America in the opening period of the twentieth century. When the assassination of McKinley placed him in the President's chair he was already alive to the need of a new conscience in American affairs. It is to his credit that he had the courage to remain a reformer after he reached the White House, and that he stirred the nation to mark out new trails in the evolution of democracy. For this achievement, if for no other, he will be regarded as one of the greatest Presidents.

Early Life. Theodore Roosevelt was born on October 27, 1858, in the city of New York. The Roosevelt family had taken root on American soil two centuries before, in 1650, when a certain ambitious burgher of the Dutch family of Van Rosenvelt emigrated from Holland. The Roosevelts, as they came to be called, fared well financially and socially, and eventually were included among the wealthy and exclusive families of old New York. The father of the twenty-sixth President, also named Theodore, was a prosperous business man, who interested himself not only in finance, but in public affairs and philanthropy. He married Miss Martha Bul-



THEODORE ROOSEVELT

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"The corner-stone of the Republic lies in our treating each man on his worth as a man, paying no heed to his creed, his birthplace, or his occupation, asking not whether he is rich or poor, whether he labors with head or hand; asking only whether he acts decently and honorably in the various relations of his life; whether he behaves well to his family, to his neighbor, to his State.

"There can be no divided allegiance here. Any man who says he is an American, but something else also, isn't an American at all. We have room but for one flag, the American flag. We have room for but one language here and that is the English language, for we intend to see that the crucible turns our people out as Americans, of American nationality; we have room for but one soul loyalty, and that is loyalty to the American people."

loch, of a well-known Southern family, and a descendant of the first governor of the state of Georgia.

It is an interesting fact that Theodore Roosevelt, the future President, who was noted for abounding vitality and extraordinary powers of endurance in his manhood, was a weakling as a boy. To overcome this handicap he courted health and strength by persistent exercise, and though his early schooling was somewhat irregular, he entered Harvard at the age of eighteen. After his graduation, in 1880, he studied law for a time at Columbia University, with the purpose, however, of broadening his mind rather than of preparing for the legal profession. Years before, the young man's father had taken an active interest in politics because he believed such participation was the duty of a good citizen. The son was to follow his example.

First Steps in Politics. In the fall of 1881, when he was just twenty-three years of age, Roosevelt won a seat in the lower house of the New York legislature. He was, to use his own words, a Republican by "education and inheritance," and he elected to work within that party as the best means of accomplishing certain ends. At that time the era of machine politics was at its height, and young Roosevelt threw himself heart and soul into a campaign against political bosses, spoilsmen and corruptionists. He was re-elected in 1882 and 1883, and his name became common in news dispatches and editorials from Boston to San Francisco. As chairman of the New York delegation to the Republican national convention of 1884, he energetically supported Senator George F. Edmunds, but when Blaine secured the nomination Roosevelt announced his intention of voting for him. It is an interesting detail that the Democratic nominee, Grover Cleveland, and the young Republican delegate had by this time become excellent friends through their work for reforms in New York, the one as governor of the state, and the other as a legislator.

A Ranchman. Roosevelt declined to run a fourth time for the legislature, and in 1884 he bought a ranch in North Dakota, seeking in Western life a respite from the strain of politics and domestic sorrows. In February of that year he lost his mother and his wife, the latter a daughter of George Cabot Lee of New York. As Alice Hathaway Lee she

had married the young Harvard graduate in October, 1880, and had become the mother of a daughter, Alice, who later married, in the White House, the Hon. Nicholas Longworth, member of Congress from Ohio.

On his Elkhorn Ranch, Roosevelt, though introduced as a "four-eyed tenderfoot," won the friendship of the other ranchers by his honesty and readiness to "play the game." They soon learned, moreover, to respect his ability as a horseman and marksman. For two years he kept up the active management of his ranch, but he remained in touch with Eastern politics by spending his winters in New York, and in 1886, while at Elkhorn, he was nominated for mayor of his home city of New York by a coalition of Republicans and Independents.

Public Life Resumed. Roosevelt was defeated in a three-sided contest, in which he had as opponents a Democrat and the well-known single-taxer, Henry George. The following December he married in London, England, Miss Edith Kermit Carow. On his return to New York he quickly resumed his political activities, made campaign speeches for Harrison in 1888, and in 1889, after the latter's election, accepted a position as chairman of the Civil Service Commission. Always a vigorous foe of the spoils system, he impartially enforced the provisions of the civil service law, and through his influence the Commission made the service much broader in its application.

Roosevelt was retained on the commission by Cleveland, Harrison's successor, but in 1895 he resigned to become president of the board of police commissioners of New York City. Enforcement of the laws and the elimination of bribery were two policies with which his name became identified, and it is not overstating a fact to say that New York is a better city to-day because of his two years' administration as its police commissioner. In 1896 he entered the campaign for McKinley. He was not a polished speaker, and in ability to sway an audience by the magic of oratory he could not approach McKinley's silver-tongued opponent, William J. Bryan, "the boy orator of the Platte." But he could win his audiences through his energy and his whole-hearted belief in his own arguments. There was vitality and honesty in his speeches, backed by a personality as distinctive as was Bryan's. He proved a very effective campaigner.

When McKinley began his first term as President the island of Cuba was in the turmoil of a revolution to which the American people were forced to give increasing attention. Roosevelt believed that the United States would have to intervene sooner or later, and he was given an opportunity to help the country prepare for such an emergency. In April, 1897, McKinley appointed him Assistant Secretary of the Navy. There was considerable "stirring of the dry bones" after he entered upon his new duties, as well as cutting of "red tape." He brought about a much-needed improvement in naval marksmanship, and was responsible for the selection of Dewey as commander of the Pacific fleet, besides bringing the whole department up to a higher standard of efficiency.

The Rough Riders. The declaration of war, in April, 1898, gave him another opportunity to serve his country. Resigning his department position, he organized the first United States Volunteer Cavalry, popularly and appropriately known as the "Rough Riders." The regiment was made up chiefly of cowboys from the Western plains, and it included many picturesque characters; in it, too, were Roosevelt admirers from the best families of the East. Assisting in its organization was Leonard Wood, its first colonel. Roosevelt himself was lieutenant-colonel, but when Wood rose to the rank of brigadier-general, his comrade in arms was promoted to be colonel, and it was he who led the Rough Riders in their great charge over San Juan Hill. In later years, when an ex-President, Roosevelt was universally spoken of as "Colonel."

Governor of New York. In September, 1898, Roosevelt was mustered out, and on January 1, 1899, he entered upon his duties as governor of New York. He had secured the nomination through the aid of the state "machine" leader, Senator Platt. The Republican party had lost prestige, and Platt knew that unless a man high in the esteem of the people were selected party defeat was sure to follow. At the same time Roosevelt bound himself in no way to follow the orders of the "bosses," and he gave the state an honest, efficient and progressive administration. If the politicians came his way, as he once said, he worked with them; if not, he worked without and in spite of them. As his term of office drew to a close Platt and other Republican leaders decided it was time to eliminate this trouble maker,

whose investigation of the state canal system and fearless attitude toward the corporate interests were interfering with the smooth running of the "machine." Accordingly, in 1900 they forced on him the nomination for the most deadening office in the national government—the Vice-Presidency. The ticket, headed by McKinley, won by a comfortable margin over the opposition, led by Bryan.

President of the United States. Six months after his inauguration, President McKinley was struck down by an assassin's bullet, and on September 14, 1901, Theodore Roosevelt took the oath as chief executive. The "trouble maker," disliked by the "bosses," was the most powerful man in America and beloved by the people. He was then only forty-three years of age, the youngest President in American history, and he came to the high office superbly

trained and in vigorous health. The new President announced that he would continue unchanged the policies of McKinley, and he asked all of the latter's Cabinet officials to remain. It was a strong Cabinet, containing such men as Elihu Root, who was Secretary of War, and John Hay, who was Secretary of State. In 1904 Roosevelt expressed his desire to be elected for a full term, and he was nominated by the Republican convention by acclamation. In the election he defeated the democratic nominee, Judge Alton B. Parker, by a popular majority of almost 2,000,000. The chief issue was the President's personality; he was accused by his opponents of recklessly violating his constitutional limitations, of invading the rights of Congress, and of being dangerously warlike. The election of 1904 showed what the people thought of these accusations.

Domestic Affairs. Roosevelt's seven and one-half years of office constitute a notable period of readjustment. When he became President the country was emerging from an era of industrial development in which "big business" had expanded without restraint. Corporate interests were wielding a pernicious influence on legislation, state and national, and the mass of the people, already awakened to this fact, were letting their



THEODORE
ROOSEVELT

murmurs be heard. Indicative of the general unrest was the great anthracite coal strike of 1902, which was settled only after the President personally urged the employers and workers to arbitrate their dispute. McKinley's moderate program of trust legislation was not only carried out vigorously but expanded by his dynamic successor, who was keenly sensitive to the volume of discontent in the country as a whole. A great body of reform legislation was the tangible result. It included the Hepburn Railway Rate Act, the Federal meat-inspection and pure-food laws, and laws for the supervision of trusts, for a systematic method of tariff alteration, and for betterment of labor conditions. Suits were brought against various railways and other corporations, including the Standard Oil Company.

In this fight for more equitable conditions the reactionary elements bitterly criticized the President for "upsetting industrial stability." It is true that a moderately-serious financial panic occurred in 1907, but at that time the nation lacked the stabilizing influence of the present Federal Reserve system. The panic showed the need of currency reform, however, and in 1908 Congress passed the Aldrich-Vreeland Bill, providing for the issuance of emergency currency. Out of this came the establishment of a Monetary Commission in 1910, and the subsequent creation, in the first Wilson term, of the Federal Reserve system.

In line with Roosevelt's attitude toward the business interests was his great conservation policy. He gave definite shape to the movement for preserving the nation's natural resources by calling a conference of governors and other public men to discuss the subject, and by appointing a conservation commission to make an inventory of the national resources. During his administration over 234,000,000 acres of mineral and timber lands and water sites were placed under government control. Congress also passed a Reclamation Act providing for the irrigation of arid lands in the West. The scope of the Department of Agriculture was greatly extended, and in 1903 a new Department of Commerce and Labor (later divided into two departments) was created. Other constructive measures included the establishment of the Census Bureau on a permanent basis, the creation of a Bureau of Immigration, the enactment of a uniform naturalization law and the creation of a general staff for the

army. As a consistent advocate of military preparedness the President worked for a larger navy, and to stimulate interest in this arm of the national defense he sent the battle fleet on a trip around the world.

Foreign Affairs. During the Roosevelt period the country was at peace and was respected throughout the world. Perhaps the most remarkable result of American diplomacy was the acquisition by the United States of a strip of land across the Isthmus of Panama. In 1903 the State Department negotiated a treaty with the state of Panama, which had seceded from Colombia, authorizing the United States to build a canal across the isthmus. The President was criticized for having had a part in the Panama rebellion, but the people as a whole believed that he did the only thing possible to prevent indefinite delay, and they upheld him. Certainly the construction of the great Panama Canal will always be linked with his name.

The principle of international arbitration was vigorously applied by the President. He persuaded Great Britain and Germany to submit certain claims against Venezuela to arbitration, and the Alaska boundary dispute between the United States and Great Britain was settled in like manner. In 1906 an insurrection in Cuba caused the United States to intervene in the affairs of the island republic, but true to its promises, the American government withdrew its power when order was restored. In the Philippines civil government was successfully put into operation, and the islands were brought closer into communication with America by the laying of a cable across the Pacific. Undoubtedly the greatest personal triumph of Roosevelt in the field of diplomacy was his intervention in the war between Russia and Japan. He intervened by inviting the Russian and Japanese governments to send peace commissioners to America, and as a result a treaty of peace was signed at Portsmouth, N. H., in September, 1905. The following year the President was awarded the Nobel peace prize, for services in behalf of international harmony.

Other Events. One state—Oklahoma—entered the Union during this administration, and there occurred one great disaster, the San Francisco earthquake and fire. A great international exposition was held at Saint Louis in 1904, in commemoration of the Louisiana Purchase; a year later the Lewis and Clark Exposition was held at Portland,

Ore., and in 1907 the Jamestown Tercentennial was celebrated at Hampton Roads, Va. In 1908 the nation mourned the passing of Ex-President Cleveland.

As Roosevelt's second term drew to a close there was a strong movement for his renomination, but he declined in favor of his Secretary of War, William H. Taft, who had won a notable reputation as civil governor in the Philippines. In the ensuing election the Republican ticket won by an electoral vote of 321 to 162. The Democratic candidate, William J. Bryan, was thus defeated for the third time.

A Great Ex-President. The last decade of Roosevelt's life was crowded with incident. He retired from the Presidency in the prime of physical and mental vigor, and to the day of his death he lived in a world of action. As soon as he was free from the claims of office he departed on a hunting trip to Africa with his son Kermit. Several valuable trophies of this expedition are now a part of the zoological collection in the Smithsonian Institution, Washington. On his journey home, in 1910, Roosevelt visited several European countries, lecturing meantime, at the universities of Berlin, Christiania and Oxford, and at the Sorbonne, Paris. Everywhere he was welcomed as the greatest American citizen, much to the gratification of the American people, who gave him an unprecedented welcome when he landed in America.

Back in Politics. When Roosevelt returned home he found a marked cleavage in the ranks of the Republicans. His personal choice for the Presidency, Mr. Taft, was definitely aligned with the regulars, or conservatives, and his own followers, the progressives, or insurgents, were in revolt. In response to a great popular demand that he resume leadership of the party, Roosevelt announced his candidacy for the Presidential nomination early in 1912, and in the spring primaries he carried state after state. Nevertheless, in the national convention which met at Chicago in the summer of 1912 the conservatives had control, and Taft secured the nomination. Amid scenes of great excitement as the roll call ended, the Roosevelt delegates marched out of the assembly hall and held a protest meeting of their own in another auditorium. This revolt was more than a party split; it resulted in the organization of a new Progressive party, with a platform calling for social reform, the initiative and referen-

dum, the recall of judicial decisions, woman suffrage and other radical measures.

A Progressive convention was held later in the summer, at which Roosevelt was nominated for President, and Hiram Johnson, governor of California, was named for Vice-President. In a campaign unmatched for bitterness Roosevelt toured the country, speaking with equal vigor against his Republican opponent and his Democratic rival, Woodrow Wilson. Late in the campaign, as he was about to enter a carriage which was to take him to an assembly hall in Milwaukee, he was shot by a deranged man. Before he would submit to medical attention, however, he proceeded to the hall and delivered his address. This incident ended his active part in the campaign, but in the election he carried more states and secured more votes than the Republican nominee. The Democrats stayed in their own camp, and, profiting by the divided Republican vote, carried forty states.

The Progressive party was permanently organized, but it did not hold the rank and file of Republicans, and in course of time the organization disappeared. Roosevelt himself returned to the Republican fold in the campaign of 1916, and actively supported Charles E. Hughes. He believed that the great revolt of 1912 had put new life into the historic party and had saved it from becoming hopelessly reactionary. Therefore, he never regretted the step he took, though he made lasting enemies thereby.

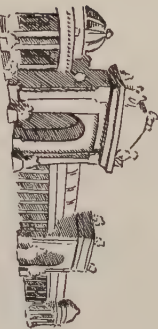
South American Trip. An exploring expedition to South America followed the dramatic events of 1912. In 1913 Roosevelt delivered addresses before several South American universities and learned societies, and between February and April, 1914, he led an exploring party for 600 miles along an unknown tributary of the Madeira River. Subsequently the Brazilian government named this stream the *Reo Teodoro* in his honor. While in the South American jungles he contracted a fever which nearly caused his death, and permanently undermined his health.

Roosevelt and the World War. Roosevelt was strongly opposed to the pacifist tendencies of President Wilson, and criticized him both for his cautious attitude in regard to Mexico and for his method of dealing with the complications arising from the World War. When the war began, in 1914, he believed, with the majority of Americans, that the



BEGINNING OF THE
PANAMA CANAL

ROOSEVELT'S ADMINISTRATION 1901 1909



LEWIS AND CLARK EXPOSITION



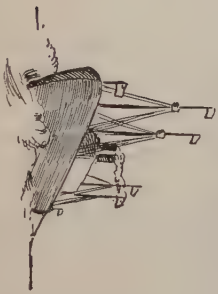
ANTHRACITE COAL STRIKE



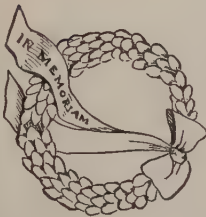
GOVERNMENT ESTABLISHED
IN THE PHILIPPINES



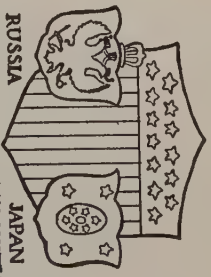
LOUISIANA PURCHASE EXPOSITION



PACIFIC CABLE LAID



DEATH OF GROVER CLEVELAND



RUSSIA
JAPAN
TREATY AT PORTSMOUTH



CONSERVATION CONGRESS



JAMESTOWN EXPOSITION



SAN FRANCISCO
EARTHQUAKE, 1906

The Administration of Theodore Roosevelt, 1901-1909

I. THE PRESIDENT

- (1) Birth
- (2) Education
- (3) Public Life
- (4) Military career
- (5) As an author
- (6) Character

II. GOVERNMENTAL AFFAIRS

- (1) Important laws
 - (a) Elkins Anti-trust Act, 1903
 - (b) Railway Rate Regulation
 - (c) Pure food and meat inspection laws
- (2) Administrative
 - (a) Reclamation and Irrigation Service established, 1901
 - (b) Census Office made a permanent bureau
 - (c) Department of Commerce and Labor established
 - (d) Reorganization of the army
 - (e) Conservation Congress
- (3) Foreign
 - (a) Relations with Venezuela
 - (b) Santo Domingo
 - (c) Cuba
 - (1) Reciprocity treaty
 - (2) U. S. provisional government
 - (d) The Isthmian Canal question
 - (1) Hay-Pauncefote treaty
 - (2) Attempts to negotiate with Colombia
 - (3) Revolution and establishment of republic of Panama
 - (4) U. S. treaty with Panama
 - (5) Construction of the canal by the United States
 - (e) Treaty of Portsmouth, 1905
 - (f) Cruise of a United States fleet around the world

III. LOCAL AND INTERNAL AFFAIRS

- (1) Expositions
 - (a) Louisiana Purchase
 - (b) Lewis and Clark
 - (c) Jamestown

- (2) San Francisco earthquake and fire
- (3) Pacific Cable laid
- (4) Anthracite coal strike
- (5) Northern Securities Case
 - (a) Northern Securities Company controlled both the Great Northern and the Northern Pacific railroads
 - (b) Court held that competing railroads could not be so controlled
- (6) New York insurance investigation
 - (a) Corruption and illegalities
 - (b) Charles Evans Hughes
- (7) Panic of 1907
 - (a) Financial crisis
 - (b) Causes
- (8) Admission of Oklahoma
- (9) Death of Grover Cleveland
- (10) Elections of 1904 and 1908
 - (a) Issues
 - (b) Candidates

Questions on Roosevelt

Give a brief account of Theodore Roosevelt's career before he became President.

What reform measures were passed in his administration?

What did the pure food laws accomplish?

What is the Reclamation Service?

When was the Department of Commerce and Labor established?

How was it later divided?

What was the Conservation Congress?

What did the Hay-Pauncefote Treaty accomplish?

When was the republic of Panama established?

What can you say about the Treaty of Portsmouth?

What great expositions were held in the United States during Roosevelt's administration?

What are the Nobel Prizes?

Who is Charles Evans Hughes?

When and how did he become prominent?

United States should remain neutral. Later, as Germany's disregard for the rights of humanity, as typified by the sinking of the *Lusitania*, became more flagrant, he was openly anti-German, and urged that America intervene. When the decisive step was taken he longed to be in the thick of the fight, and offered to lead a volunteer division in France. This honor was denied him, but he gave his four sons to the cause, all of whom won honor in active fighting. His youngest son, Quentin, lost his life as an aviator, and lies buried in France.

Throughout the period of American participation Roosevelt unsparingly criticized anyone, from the President down, who he thought was not energetic enough in carrying on the struggle. Possibly his criticisms were not always just, but a man of his temperament could not do otherwise.

This exponent of the "strenuous life," whose career was a series of hard-fought battles, died quietly in his sleep, at Sagamore Hill, his home at Oyster Bay, on the morning of January 6, 1919. He had lived to see the triumph of the cause that meant so much to him, but, in the words of a contemporary observer, "If his biographers read his end aright, they will see him as a man who died when and how he did chiefly because of an overwhelming but frustrated desire to join his fellow countrymen in the great fight."

The Roosevelt Writings. The marvelous versatility of Theodore Roosevelt is shown in the great body of writings which he left. Both for style and for subject matter these writings are of permanent value and interest. His first book, *History of the Naval War of 1812*, he published in 1882; he was still writing in the last year of his life. The Roosevelt publications fill twenty-five volumes, and include history, biography, narratives of the writer's travels, collections of lectures and essays on varied subjects, an autobiography and nature sketches. Representative titles include *Winning of the West*, *Life of Gouverneur Morris*, *The Strenuous Life*, *True Americanism*, *The New Nationalism*, *African Game Trails* and *Fear God and Take Your Own Part*.

Related Articles. Various events and topics referred to in this article are given fuller treatment under the following headings:

Cleveland, Grover	Political parties in the
Colombia	United States
Conservation	Pure Food Laws
Cuba (history)	Rough Riders
McKinley, William	Spanish-American War
Nobel Prizes	Taft, William H.
Panama Canal	Trusts

ROOSEVELT DAM. See IRRIGATION.

ROOT, in mathematics, one of the equal factors of a number or quantity, or a number or quantity which when multiplied by itself one or more times will produce a given number or quantity. To illustrate, since $4 \times 4 = 16$, 4 is a root of 16; again, since $5 \times 5 \times 5 = 125$, 5 is a root of 125. Square root is one of two equal factors of a quantity, and cube root is one of three equal factors. See EVOLUTION; SQUARE ROOT; CUBE ROOT.

ROOT, ELIHU (1845-), an American statesman, diplomat and corporation counsel, prominently identified with the affairs of his country for nearly two score years. He was born at Clinton, N. Y., and was educated in that town at Hamilton College. After his graduation in law at New York University he was admitted to the bar, and in 1867 began the practice of law in New York City. Root's first public office was that of United States district attorney for the New York southern district. This office he held from 1883 to 1885. He was later prominent in Republican politics, and in 1899 succeeded Russell A. Alger as Secretary of War in McKinley's Cabinet. When Roosevelt became President he retained Root as head of the War Department, and the latter served with distinction until 1904, when he retired to practice law. In 1905 he succeeded John Hay as Secretary of State, and in 1909 he entered the United States Senate. While in the Senate he acted as counsel for the United States in the arbitration of the North Atlantic fisheries dispute (1910), and in the same year was appointed a member of the Permanent Court of Arbitration at The Hague. For his activities in behalf of international peace he was awarded the Nobel prize for peace in 1912.

Root retired from the Senate in 1915. In 1917 President Wilson appointed him chairman of the American commission to Russia, which conferred with the leaders of the new democratic government on economic and financial matters. After the war Root was retained as counsel by the brewing interests of the United States, in their struggle against prohibition. In 1921 he was an American representative to the conference on limitation of armaments.

ROOT, GEORGE FREDERICK (1820-1895), an American composer, born at Sheffield, Mass. He taught music in Boston and New York, studied a year in Paris and then returned

to America. During the Civil War period he made a fortune by publishing patriotic songs, most of them his own compositions. These include *Tramp, Tramp, Tramp the Boys are Marching*; *The Battle Cry of Freedom*; *Just Before the Battle*, *Mother and There's Music in the Air*. Among his more ambitious works are a *Te Deum*, *Belshazzar's Feast* and *The Pilgrim Fathers*.

ROOTS. The root is one of the three essential parts of a plant, the others being the stem and the leaves. Ordinarily roots grow downward into the soil, and when no descriptive term is given with the word means that part of the plant which grows in the ground and through which the plant obtains its nourishment from the soil. The root also holds the plant in position. Roots that spring directly from the embryo are called *primary*; those that spring from primary roots are called *secondary*. All the roots of a plant form its *root system*. The tiny rootlets, or *root hairs*, are the organs through which the plant draws water and nourishment from the soil.

In forms roots are *fibrous* or *fleshy*. The roots of corn, wheat and grass are good illustrations of fibrous roots. Turnips, beets and sweet potatoes are good illustrations of plants with fleshy roots. *Aerial* roots are those growing in the air, like roots developed by some orchids. Some plants, like the water hyacinth, have roots that live in the water. A *taproot* is the main root of a fibrous system, like the largest root of a tree. *Adventitious* roots spring from the stem and serve to brace the plant. Those in corn are a good example. See BOTANY, PLANT.

ROPE, a cord one or more inches in diameter. The distinction between rope and cordage is in size only, the term *cordage* being applied to sizes less than one inch in diameter. Hemp, jute, coir and cotton are the vegetable fibers most generally used for making ropes. Manila hemp, obtained from the Philippine Islands, is the most desirable, because of its strength. While cotton makes the strongest rope, it is too expensive for general use.

The process of manufacture is practically the same for all material, and most of the work is done by machinery. The hemp is received at the factory in bales. The fiber is first straightened and sprinkled with oil, then is passed through a machine called a *spreader*. From the spreader the hemp passes through a number of *breakers*, which straighten the

fibers and arrange them into a ribbon called the *sliver*. The sliver passes through another series of breakers, which prepare the fiber for spinning. As the fiber is spun, the yarn is wound on large bobbins. The yarn is then twisted into strands, and the strands into rope. Three strands are used in making a small rope, and a larger number for larger sizes.

The strength of a rope depends upon its size and the material of which it is made. A hemp cord 1.53 inches in circumference will sustain a weight of 1,670 pounds; one 2.7 inches in diameter will withstand a strain of over 33,800 pounds.

Wire Rope. Wire ropes are made of wires twisted together, in the same manner as hemp is manipulated in making hemp ropes. Steel, iron or copper wire may be used, but steel is most generally employed, because of its greater strength and durability. Wire ropes are used for cables, in derricks and other hoisting machines, for rigging ships and for numerous other purposes.

ROB'QUAL, the name of the largest species of whales. The rorqual is distinguished from the *common*, or *right*, whale by having a dorsal fin and deep wrinkles on the throat. The head is comparatively small and flat, the body long and slender; the tail narrows before expanding into flukes. Rorquals are not as valuable as the right whale. See WHALE.

RO'SA, MONTE, mountain or group of mountains in the Pennine Alps, lying on the frontier of Switzerland, and second in altitude only to Mont Blanc, from which it is about fifty miles distant. It consists of eight summits, the highest being Dufourspitze, 15,217 feet. The mountain is covered with snow, and on one side is the great G6rner glacier. In 1904 an observatory was established on Monte Rosa at an altitude of 15,000 feet.

ROSACEAE, *ro za'se ee*, or the Rose family, one of the most important orders of flowering plants, containing about seventy-five genera and 1,200 species of herbs, shrubs, and trees. Most of these species live in cooler parts of the northern hemisphere, and many are of great value. The apple, pear, plum, cherry, peach, almond, nectarine, apricot, strawberry and the raspberry are all fruits of the rose family, and they vary greatly in structure. The leaves differ as much as the fruit, although the flowers have a characteristic appearance easily recognized



SOME MEMBERS OF THE ROSE FAMILY

1—Wild Rose. 2—Plum. 3—Peach. 4—Blackberry. 5—Raspberry. 6—Strawberry.
7—Cherry. 8—Cultivated Rose. 9—Apple. 10—Pear.

from their resemblance to the apple or strawberry blossom. Many of these fruits and flowers are separately described in these volumes under the names of specific species. See ROSE.

ROS'AMOND, commonly called FAIR ROSAMOND, the mistress of Henry II of England. She died about 1176, soon after her connection with the king was openly avowed, and was buried in the church of Godstow Nunnery, from which Hugh of Lincoln caused her body to be removed in 1191. Almost all the stories related of Rosamond are legendary. The fable of the dagger and poison, with which the jealous Queen Eleanor is said to have sought out her rival, originated long after Rosamond had died.

ROSARIO, *ro sah're o*, ARGENTINA, the second largest city in the republic, surpassed only by Buenos Aires. It is on the west bank of the Parana River, 170 miles northwest of Buenos Aires, in the southern part of the province of Santa Fé. It has rail communication with the interior provinces and with the Argentine capital, and is a busy river port. The city is well built, with wide streets, numerous parks and attractive homes. Modern electric street cars have been operated in Rosario since 1908. The city has prosperous flour mills, breweries and other manufactories, and the largest sugar refinery in the republic. There is a vast import and export trade, which is facilitated by modern docks, wharves, warehouses and other harbor accommodations. Rosario has, among other structures, handsome bank buildings, a courthouse covering an entire city block, fine public school buildings and a cathedral. Population, 1918, estimated, 235,000.

ROSARY, *ro'za ri*, in the Roman Catholic Church, a series of devotions consisting of a specified number of paternosters, aves and glorias arranged in groups. It begins with a paternoster (the Lord's prayer). This is followed by ten aves (salutations to the Virgin), and after these is a gloria (doxology). The ordinary rosary consists of fifteen of such groups. A string of beads, also called a rosary, is used to count the prayers. It ends in a pendant, to which is attached three beads and a crucifix. The beads, large and small, represent respectively paternosters and aves, and the crucifix stands for the Apostles' Creed. In reciting the aves the devotee meditates upon the various mysteries of the life of Christ—the joyful

mysteries (annunciation and nativity), the sorrowful mysteries (the passion), and the glorious mysteries (the resurrection and ascension).

The Greek, Armenian and other Eastern communities also use in their devotions a chaplet called a rosary.

ROSE, a genus of beautiful and fragrant flowers which has given its name to one of the largest botanical families, the *Rosaceae* (which see). Innumerable cultivated varieties of the rose have been developed, but in nature the rose plant is a thorny shrub with pinnate leaves. The shrubs vary in height from one to six or more feet, excepting those varieties that take the form of vines. The flower has five petals surrounding numerous stamens. The seeds are enclosed in a spherical receptacle, which when ripe forms a dry berry. The rose in its original form is seldom found except in an occasional old-fashioned garden and on the prairie. Roses cultivated for their flowers have been developed from the wild species by changing the stamens into petals.

Among the most common of the garden roses are the *pink cabbage*, or *Provence rose*, a very old variety of Eastern origin; the *Cherokee rose*, a native of China, with single, large, pure white flowers; the old-fashioned sweet-scented *cinnamon rose*, from Europe; the *pink damask roses*, from Damascus; the *climbing evergreen rose*, of Southern Europe, with its shining leaves and brilliant flowers; the *Scotch roses*, which are of dwarf stature, but very hardy, producing early in the summer an abundant crop of red, white or yellow flowers; the common *white rose*, from the Caucasus; the common *yellow rose*, from Asia Minor, often called the Austrian brier, or yellow eglantine; the *Bengal*, or *monthly rose*, a hardy, perpetual bloomer, with a profusion of brilliant flowers, and the *Queen of the Prairie* and *Baltimore Belle*, cultivated varieties of the wild prairie rose. In the wonderful climate of Cannes, France, the



THE ROSE

Riviera, Italy, and Southern California, roses grow in a beauty and profusion that can scarcely be conceived by one who has never visited these places. There are bowers of roses, hedges of roses, and cottages and even public buildings are almost hidden by them. Among the principal greenhouse varieties are the *American Beauty*, dark red; the *bride*, white; the *bridesmaid*, pink; the *pearl of the garden*, yellow; the *liberty*, crimson and the *Ulrich Brunner*, cherry red.

In the language of flowers, the red or white rose stands for love and the yellow rose for jealousy. The rose is the national flower of England and Persia, and the state flower of New York and Iowa. Portland, Ore., is known as the "Rose City", and a carnival of roses is held there on some day in June, every year. The tournament of roses held every New Year's Day in Pasadena, California, has become one of the most gorgeous flower spectacles in the world.

Rose growing in hothouses has become a very important industry in the United States and has been brought to a remarkable degree of perfection. Every good greenhouse has its rose house, where the plants are given the tenderest care. They require a stiff pasture loam, careful fertilization, good drainage and plenty of ventilation. Different varieties, however, require such different treatment that the florist must know thoroughly the nature of each individual plant. For the sake of convenience, the florists and botanists divide all cultivated roses into two classes—summer, or once-blooming, roses, and autumnal, or ever-blooming, roses.

ROSEBERRY, *roze'ber ry*, ARCHIBALD PHILIP PRIMROSE, Earl of (1847–), an English statesman, educated at Eton and Oxford. In 1868 he succeeded to the earldom and entered the House of Lords. He was under-secretary at the home office from 1881 to 1883, lord privy seal and first commissioner of works in 1885, and in the next year he held the secretaryship of foreign affairs, till the fall of the Gladstone government. In 1889 he became a member of the London County Council and was appointed chairman of that body. In 1892 he became Secretary of State for Foreign Affairs under Gladstone, and in 1894 he succeeded Gladstone as Premier, holding office, however, little more than a year. Early in his career he won the favor of the masses by advocating measures for bettering the conditions of the working

people. He is the author of *William Pitt, Appreciations and Addresses*, *Sir Robert Peel*, *Napoleon*, *Cromwell* and *Chatham*.

ROSECRANS, *ro'ze krans*, WILLIAM STARKE (1819–1898), an American general, born at Kingston, Ohio. He graduated at West Point in 1842 and was employed there for a time as assistant professor. In 1854 he resigned from the army and became a civil engineer, but when the Civil War broke out he volunteered as aide to General McClellan.

When McClellan was appointed commander of the Army of the Potomac Rosecrans was given the rank of brigadier-general and placed in command of the forces in Western Virginia. In 1862, after the evacuation of Corinth by the Confederates, he was given command of the army in Mississippi and successfully defended the city against Price and Van Dorn. Later he commanded the Department of the Cumberland. He defeated the Confederates under Bragg in the Battle of Murfreesboro, but at Chickamauga was defeated by Bragg, with great loss. He was succeeded by General Thomas and later was relieved of his commission. At the close of the war he resigned from the army.



ROSECRANS

ROSEMARY, *roze'mary*, an evergreen aromatic shrub of the mint family, a native of Southern Europe. It grows from four to eight feet high, has dark green leaves, with a white under surface, and pale blue flowers in graceful sprays. Rosemary yields, by distillation, an oil used in making perfumes and aromatic waters. The rosemary is an emblem of remembrance and fidelity. *American rosemary*, found on the Atlantic coasts, belongs to the leadwort family.

ROSE OF JERICHO. See JERICHO ROSE.

ROSES, WARS OF THE, the name given to the struggle for the throne of England between the House of Lancaster and the House of York. The emblem of the House of Lancaster was a red rose and that of the House of York a white rose, hence the name of the conflict. The war began in 1455 with the Battle of Saint Albans, and lasted, with short

intervals of peace, for thirty years, ending with the Battle of Bosworth in 1485.

At the beginning of the struggle, Henry VI, a Lancastrian, was on the throne. His chief opponent was Richard, Duke of York. During the struggle Henry was deposed, then reinstated and deposed a second time, while the head of the Yorkist faction, Edward IV, managed to hold the throne, with the exception of a short interval, from 1461 to 1483. After the accession of Richard III, a rising occurred under the Duke of Richmond, who drove Richard from the throne and himself was crowned king as Henry VII. He married Elizabeth, daughter of Edward IV, and thus united the two factions.

ROSETTA STONE, a tablet of black basalt found near Rosetta, Egypt, by a French engineer in 1799, and now in the British Museum. The tablet contains identical inscriptions in ancient Egyptian hieroglyphics, in Demotic, a modified form of the Egyptian writing, and in Greek. By comparing the Egyptian characters with the Greek a clue to these ancient writings was found, so the Rosetta stone is considered to be the key to the ancient Egyptian hieroglyphics. The inscription on the stone was in honor of Ptolemy V, Epiphanes, and was made in 195 B. C. See **HIEROGLYPHICS**.

ROSE WINDOW, a circular window, divided into compartments by mullions and tracery radiating from a center, also called *Catharine wheel* and *marigold window*, according to the modifications of the design. It forms a fine feature in the church architecture of the thirteenth and fourteenth centuries, and it is mostly employed in the triangular spaces of gables. In France it is much used, and notwithstanding difficulties of construction, it has attained great size. Fine examples are to be seen in the cathedrals of Paris, Rheims, and Amiens. During the World War a number of these windows, which were exquisite works of art, were destroyed.

ROSEWOOD, the name of several varieties of wood used in making musical instruments and ornamental furniture. The rosewoods are usually of a deep rose color, marked with dark lines, which under polishing becomes almost black. The woods are used in veneering furniture and in making the cases of pianos and other musical instruments. The best wood is obtained from Brazil, the East Indies and Africa. The odor

of rosewood is noticeably like that of roses, and from this fact the name is derived.

ROSIN, *roz'in*, the resin of cone-bearing trees, especially pitch pine, from which it may exude in small quantities. The resin of commerce is prepared by distilling turpentine. The resin remains in the tank, and the turpentine passes over. Rosin is brittle and of yellowish-brown color, and it has a characteristic odor, but is practically tasteless. It is used in the manufacture of sealing wax, varnish, cement and soap; for soldering, and in the manufacture of various kinds of plaster and cement. See **RESINS**; **TURPENTINE**.

ROSS, ALEXANDER (1783-1856), a Canadian pioneer and author. He went to Canada from Scotland in 1805, joined Astor's expedition to Oregon in 1810 and was afterward a fur trader in the Hudson Bay Company's service. He is the author of *Adventures of the First Settlers on the Oregon, The Fur Hunters of the Far West* and *The Red River Settlement*.

ROSS, BETSY (1752-1836), a Philadelphia seamstress who became famous in American history as the maker of the first United States flag. In June, 1777, a committee from Congress, headed by General Washington, came to her house at 239 Arch Street to commission her to make a flag according to a design adopted by Congress on June 14. The flag Mrs. Ross made had thirteen stars arranged in a circle on a blue ground, and thirteen stripes, alternate red and white. It was so much admired that the government made a contract with her to make all the flags, and it engaged the daughter of Mrs. Ross to continue the work long after her mother's death. The house on Arch Street is preserved as a memorial of the famous seamstress.

ROSS, JAMES CLARK, Sir (1800-1862), an Arctic and Antarctic explorer, born in London. He entered the British navy at the age of twelve, accompanied his uncle, Sir John Ross, on his two voyages in search of a northwest passage and in the interval between them accompanied Captain Parry in four Arctic voyages. He was promoted to the rank of post captain in 1834, particularly for the determination of the position of the north magnetic pole. He commanded the expedition of the *Erebus* and *Terror* to Antarctic regions (1839-1843), and discovered Victoria Land and several islands. He attained latitude 78° 10' S., a record which was not broken until 1900. His published narra-

tive of this voyage was a valuable contribution to geographic and scientific knowledge. He was knighted for his services. In 1848 he made an unsuccessful expedition to Baffin's Bay, in search of Sir John Franklin. In 1856 he was made rear-admiral. See NORTH POLAR EXPLORATION; SOUTH POLAR EXPLORATION.

ROSSETTI, CHRISTINA GEORGINA (1830-1894), an English poet, the sister of Dante Gabriel Rossetti, was born in London, and educated at home. Her main interests were religion and poetry, and she lived a quiet, retiring life, devoting her time to literary pursuits. Many of her best poems are distinctly religious in tone, but they are also noteworthy for their revelation of the beauty in the world. Critics agree in ranking her next to Elizabeth Barrett Browning among the English women writers of the nineteenth century. *Goblin Market and Other Poems*, *The Prince's Progress and Other Poems* and *A Pageant and Other Poems* contain most of her works. *Up Hill* is probably her most popular poem.

ROSSETTI, GABRIEL CHARLES DANTE (1828-1882), better known as Dante Gabriel, an English painter and poet, born in London, the son of an Italian patriot, who was a refugee in England and a professor in Oxford. He early showed a genius for art, studied in the Royal Academy and later became a pupil of Ford Madox Brown. His intensity of feeling in both painting and poetry gathered around him a small group of painters, among whom were Holman Hunt, Thomas Woolner, Millais and others, who founded the so-called *Pre-Raphaelite Brotherhood*, with Rossetti as their leader. This group advocated a return to the purity and idealism of the old masters before Raphael, and their effort was to ennoble art and to give their work sincerity. Other painters who have continued the practice of these principles are called Pre-Raphaelites (which see). In 1849 Rossetti exhibited his painting of the *Girlhood of Mary Virgin*; but his later works, numerous as they were, were rarely seen by the public until the posthumous exhibition of a collection of his paintings in 1883 at the Royal Academy. His principal paintings are *Dante's Dream*, *Salutation of Beatrice*, *Dying Beatrice*, *La Pia*, *Proserpine*, *Sibylla Palmifera*, *Monna Vanna*, and *Venus Verticordia*. In most of his pictures he has represented the face of his wife,

to whom he was very devoted. His subjects are generally religious or mystical and reveal wonderful imaginative sentiment and wealth of color.

As a poet Rossetti takes high rank. At the age of twenty he wrote his most famous poem, *The Blessed Damosel*, a rare combination of simplicity and spirituality. It is considered to represent the aims and ideals of the Pre-Raphaelite School, both in literature and art. *My Sister's Sleep*, another of his early poems, is also of rare merit. Besides these, *The House of Life*, *The King's Tragedy and Other Ballads*, and *Dante at Verona* include most of his poems. In 1861 he published *The Early Italian Poets*, a series of translations afterwards reissued under the title of *Dante and His Circle*.

ROSSINI, rohs sé'ne, GIOACHINO ANTONIO (1792-1868), an Italian composer born at Pesaro. He wrote many comic and serious operas, all of those by which he is most widely known appearing before he was thirty years old. The best known of his operas are *The Barber of Seville*, *Othello*, *William Tell*, *Semiramide*, *Ermione*, *Moses in Egypt* and *Lady of the Lake*. Perhaps his most famous work is *Stabat Mater*. Before he had reached middle life, Rossini had become one of the best-known composers of his day, but his indolence and vanity caused his popularity to wane rapidly. He resided at different times in London, Paris, Naples, Florence and Bologna, and died in comparative obscurity.

ROSTAND, rohs tahN', EDMOND (1869-1918), a French dramatist and poet, and author of a celebrated play *Cyrano de Bergerac*, was born at Marseilles. He was the son of a great journalist, and his early writings showed his skill and ability. His first play, a comedy, was produced in Paris in 1894, and was very successful. *Cyrano* was translated into English and several other languages, and was produced in the leading cities of Europe and America. His next famous play was *Chantecler*, a fantasy of bird and animal life, which was eminently successful. Rostand was elected a member of the French Academy in 1902.

ROSWELL, rahz'wel, N. M., the county seat of Chaves County, 230 miles northeast of El Paso, on the Pecos, Berrendo, Spring and Hondo rivers, and on the Atchison, Topeka & Santa Fé Railroad, built to the city in 1900. There is a Carnegie Library, a courthouse, a Federal building, a hospital and

the New Mexico Military Institute. The surrounding country is a farming and stock-raising section. Roswell is governed on the city manager plan. Population, 1910, 6,172; in 1920, 7,062, a gain of 14 per cent.

ROT, a disease afflicting sheep and occasionally other domestic animals. It is caused by the presence in the gall bladder of a parasite known as the liver fluke, which is developed from germs swallowed by the animals with their food. The average length of the fluke is about one inch. Several dozen of these parasites may sometimes be found in the liver of a single sheep. Damp atmosphere or damp soil or fodder promotes the disease, which in almost all cases proves fatal.

ROTATION OF CROPS, the practice in agriculture and horticulture of growing different crops on the same piece of land in succeeding years. The plant foods found in the soil—nitrogen, phosphorus and potash—occur in varying proportions in different soils. Some plants require more of one of these foods than others, and if the same plant is raised on the land year after year, at least one of these foods will become exhausted to such an extent that the plant will not receive sufficient nourishment to produce a good crop. Moreover, if the same crop is grown continually on the same ground, diseases and insect pests increase from season to season. Rust and cinch bugs destroy wheat, but if a crop of wheat is followed by one of corn or clover, these pests disappear because there is nothing for them to feed upon. Such crops as wheat, oats and barley, that do not admit of tillage, allow weeds to multiply rapidly. If such a crop is followed by corn or some other crop that admits of tillage for several weeks, most of the weeds are killed.

From the above illustration it is evident that rotation of crops is necessary because—

1. It is one of the best means of maintaining the fertility of the soil.
2. It is a check upon plant diseases and insect pests.
3. It enables the farmer to check the growth of weeds.

Systems of Rotation. Many systems of crop rotation have been advocated, and all contain certain underlying principles that the farmer should understand. However, no system can be applied successfully to any large area, because in planning crop rotation the farmer must consider chiefly local conditions, such as the nature and fertility of his soil, the

adaptation of climatic conditions to the crops under consideration, the probability of marketing his crop at a profit, and the economy of labor connected with raising the various crops. All systems include grain crops, grass crops and cultivated crops, with at least one application of manure during the series.

The following five-years' rotation yields good results in many localities: First year, corn, following an application of eight tons of manure per acre; second year, wheat; third and fourth years, grass (timothy and clover); fifth year, oats.

School Work in Rotation of Crops. The subject of agriculture in the public schools is one to which more and more importance is attached every year. In some counties each teacher is furnished with a tentative course in agriculture for all grades, and while it is not compulsory usually to follow such an outline, it is always strongly recommended.

If in any school there is sufficient interest in the matter and enough time can be given to it, a form of work in agriculture after the following outline may well be adopted.

A field seventy-two feet by one hundred eight feet, not counting spaces for walks, should be provided. A diagram of such a plot offered by County Superintendent George W. Brown of Paris, Illinois, is used by permission. It is a modification of a plan suggested by officials in the Western Illinois State Normal School.

10	11	12	13	14	15
20	21	22	23	24	25
30	31	32	33	34	35
40	41	42	43	44	45

DIAGRAM OF EXPERIMENTAL FIELD

Every boundary line should be a grass or gravel walk three feet wide. Every square should be eighteen by eighteen feet. Before harvesting a crop on any square each plot or square should be cut down to the dimensions of the square rod for purposes of easy computation and record. Having determined the yield in one square rod, mul-

tively by 160 to determine the yield per acre. On such a plot it is possible to study with excellent results rotation of crops.

Rotations should be conducted as follows:

Plots 10, 11, 12, 13, 14, 15—Continuous corn crops.

Plots 20, 21, 22, 23, 24, 25—Corn and oats rotation.

Plots 30, 31, 32, 33, 34, 35—Corn, oats and clover rotation.

Plots 40, 41, 42, 43, 44, 45—Corn, oats, clover and wheat rotation.

The experiments in the value of standard fertilizers could be tested in this way:

Plots 10, 20, 30, 40—Nothing.

Plots 11, 21, 31, 41—Apply manure.

Plots 12, 22, 32, 42—Manure and lime.

Plots 13, 23, 33, 43—Manure, lime and phosphorus.

Plots 14, 24, 34, 44—Manure, lime, phosphorus and potassium.

Plots 15, 25, 35, 45—Nothing, and, in addition, permit no vegetable matter to decay. Remove it.

All work can be done with hands and primitive tools. These experiments can be directed upon about thirty-five square rods or about one-fifth of an acre. This small tract of land will answer the same questions, in the same way, as the larger fields. The agricultural college in your province will doubtless be very glad to coöperate with you in connection with your experiments along the above lines.

ROTHSCHILD, *rote'shilt* or *roths'child*, a famous family of financiers and bankers.

Mayer Anselm Rothschild (1743-1812), the founder of the family, was born in Frankfort-on-the-Main. He proved most successful in his management of the fortune of the elector of Hesse-Cassel, and his family was given the patronage of the elector. All five of the sons of Mayer Anselm were made barons by the emperor of Austria. These five sons founded banking establishments in five of the large cities of Europe and established agencies at other places, both in Europe and in America.

Lionel Rothschild (1808-1879), a grandson of the first Mayer Anselm, was born in London and became the head of the London house of Rothschild. He was several times elected to Parliament, but each time he was refused the right to take his seat, because he declared he could not conscientiously repeat the last words of the oath—"on the true

faith of a Christian." He virtually brought about Jewish emancipation in England.

Nathan Mayer Rothschild (1840-1913), the first Lord Rothschild, was raised to the peerage in 1885, and was the first of his race upon whom the honor was conferred. The various banking houses are still carried on by descendants of the Rothschild brothers.

ROTTERDAM, NETHERLANDS, the chief commercial port and the second largest city of the country, is in the province of South Holland, on the Meuse River, about fifteen miles southeast of The Hague and forty-four miles southwest of Amsterdam. The city is divided into two parts by High Street. The old quarter is filled with quaint wooden buildings, while the new part is laid out with wide, well-kept streets, lined with substantial buildings. The principal buildings are the Saint Lawrence, a fifteenth-century church in the Gothic style, the exchange, the town-hall, the courthouse and the postoffice. North of the city is the large zoölogical and botanical garden, and west of the city is a beautiful park.

Shipbuilding constitutes the principal industry of Rotterdam, but others of importance are the manufacture of cigars, spirits, paints, chemicals and sugar. A thriving trade in butter, cheese, linen and flax is carried on. Rotterdam has a great system of docks and harbors, and the location of the city makes it an important center of maritime trade. The chief imports through Rotterdam are grain, ores, metals, coffee, tea, oil, tobacco and cigars. The same articles are reshipped for export, along with lumber and some animal products. Population, 1920, 510,538.

ROUBAIX, *roo bay'*, FRANCE, a city in the department of Nord, situated seven miles northeast of Lille, important as a center of the manufacture of textiles and also as the seat of the National School of Industrial Arts. The city was captured by the Germans in 1914, remaining under martial law until the German retreat from the Lille region. Population, 1921, 113,265.

ROUEN, *roo ahN'*, FRANCE, situated on the Seine, eighty-four miles northwest of Paris and fifty-six miles east southeast of Havre. The town is characterized by crooked, though picturesque, streets, and old houses, with quaint gables and carved timbers. Many specimens of medieval architecture have been retained, though in the newer part of the town the old streets and buildings have given

way to broad boulevards and modern structures. The city contains the finest Gothic cathedral in France; the Church of Saint Ouen is also worthy of note. Other buildings of note are the Palais de Justice, the Hotel de Ville, which contains the public library, and the archbishop's residence. There are in the city also a number of museums of antiquities and art collections of great value. In the Place du Vieux Marché, Joan of Arc was burned at the stake, in 1431, and a monument to her memory stands upon the spot.

Rouen has extensive docks, second only to those of Paris, and is an important commercial and industrial center. The leading industries are cotton spinning and the manufacture of coarse cotton goods, called *rouenneries*. Following this in importance are the manufactures of silk, chemicals, soap, machinery and foundry products and the refining of sugar. The city became an important post under the Romans and was formerly the capital of Normandy. It was captured from King John of England by Philip Augustus in 1204, but was returned to the English thirty years later. From 1419 to 1449 it was in possession of the English, from whom it was taken by the French under Charles VII. Population, 1921, 123,712.

ROUGE, *roozh*, a very fine scarlet powder, used by jewelers for polishing purposes and prepared from crystals of sulphate of iron, exposed to a high temperature. The name is also given to a cosmetic used in coloring the cheeks. See SAFFLOWER.

ROUGE-ET-NOIR, *roozh a nwahr*, (French, "red and black") or TRENTE-UN (*thirty-one*) or TRENTE ET QUARANTE (*thirty and forty*), a modern gambling game played with the cards belonging to six complete packs. The players are arranged about a table covered with green cloth, on which is a diagram showing four spaces, upon which money may be placed as a bet, namely, *rouge*, *noir*, *couleur* and *inverse*. The banker then deals a row of cards for *noir*, until the exposed spots number between 30 and 40 (face cards count 10, aces 1), and a similar row for *rouge*. The row wins which most nearly approaches the number 31, and players staking on the winning color receive their stake doubled. *Couleur* wins if the first card turned up in the deal is of the winning color; in the contrary case *inverse* wins. When the number of spots in both rows are equal it is a *refait*, or tie, and a fresh deal is made;

but if both happen to count exactly 31 the banker claims one-half of all stakes. This last condition places the bankers at an advantage, calculated to be equal to about 1¼ per cent on all sums staked.

ROUGET DE LISLE, *roo zha' de leel*, CLAUDE JOSEPH (1760-1836), a French poet and composer, author of the *Marseillaise*, the national anthem of France. He was born at Lons-le-Saunier. In the army he rose to the rank of captain of engineers, but was twice suspended because he would not sanction the violent measures of the Revolutionary party. He was pensioned by Louis Philippe, and devoted his last years to music and poetry. In 1915 his body was placed with impressive ceremony in the Hôtel des Invalides, Paris. See MARSEILLAISE.

ROUGH RIDERS, the name given to the first regiment of United States volunteer cavalry in the Spanish-American War. It was organized by Theodore Roosevelt, who resigned his position as first assistant Secretary of the Navy to become lieutenant-colonel. The regiment was composed largely of cowboys. It won particular distinction at the battles of El Caney and San Juan. In 1899 a patriotic hereditary society was organized, to which members of the Rough Riders and their eldest sons, were admitted. See ROOSEVELT, THEODORE.

ROULETTE, *roo let'*, a game of chance, first played in the gambling rooms of Monte Carlo. The roulette (little wheel) lies in the center of a table covered with green cloth. This cloth is divided by lines radiating from the center of the wheel, and the spaces are marked *passe*, *pair*, *manque*, *impair*. There are also two diamond-shaped spaces, colored respectively red and black. The wheel has thirty-seven compartments—one marked *zero*, the rest numbered consecutively. *Manque* indicates numbers from one to eighteen, inclusive; *passe*, all numbers above that. *Pair* means even numbers; *impair*, uneven. An attendant, called a *croupier*, starts the wheel revolving, the bettors stake their money, and a small ivory ball is thrown off by the motion of the wheel into one of the numbered compartments.

ROUMANIA. See RUMANIA.

ROUNDHEADS, the name applied in derision to the members of the Puritan, or Cromwell, faction by the adherents of Charles I, at the outbreak of the Civil war in England in 1642. The members of the

Parliamentary, or Cromwell faction, were distinguished by having their hair closely cut. The adherents of Charles, who styled themselves *Cavaliers*, wore their hair in long ringlets.

ROUND TABLE, in the legends of King Arthur, the circular table about which the knights of his court took their seats, and, in consequence, the fraternity of knights itself. Each seat at Arthur's table bore the name of the knight to whom it was assigned. One called the Siege Perilous, was reserved for him who should prove worthy of the quest of the Holy Grail. The round table has been immortalized in song and story, the most famous piece of literature founded upon the legend being Tennyson's *Idylls of the King*.

ROUND TOWERS, a class of circular stone towers erected in the Middle Ages. Examples are found in Ireland, Scotland and Central Europe. They are from twenty to thirty feet in diameter, and from sixty to 130 feet high. The doors, from six to twenty feet from the ground, are reached by means of ladders; ladders also serve as stairs from floor to floor. The top story has four windows; each of the remaining stories has one window. These towers are thought to be the work of an early Christianized race who erected them as places of refuge and as watch-towers. They date from a period extending from the eighth or ninth to the thirteenth century.

ROUSSEAU, *roo so'*, JEAN JACQUES (1712-1778), the man of whom Lord Morley said, "His message gave Europe a new gospel," and of whom Napoleon said, "Without him the French Revolution would never have occurred."

Rousseau was one of the most brilliant and influential French writers of of the eighteenth century. But little is known of his early life, except that in his boyhood he was apprenticed to an engraver, from whom he ran away. He then fell under the care and influence of Madame de Warens, who sent him to a Catholic school. After leaving the institution he wan-

dered aimlessly about Europe for a time, then returned to Madame de Warens, spending three years with her in her country home.

In 1741 Rousseau went to Paris, and in 1743 obtained the position of secretary to the French ambassador at Venice. He resigned in 1745 and returned to Paris, where he led a precarious life, copying music and studying science. In 1750 an essay, in which he adopted the negative side of the question whether civilization has tended to purify morals, won a prize offered by the Academy of Dijon. This for the first time brought Rousseau into general notice, and was the turning point in his career. He then began to study the philosophy of government and the social conditions of the country. During the next fifteen years he produced works which revolutionized the thought of the continent. The most noted of these are *Discourses on Inequality*; *Julie, or the New Heloise*; *The Social Contract*; and *Emile*, a treatise on education. An account of his life is given in his *Confessions*, a work of twelve volumes. *Emile* is the work by which Rousseau is most widely known at the present time. Many of the principles adopted by Pestalozzi and Froebel were taken from this work, and it may be said to have laid the foundation of modern education.

"Rousseau was a man of marked contrasts;" a character, says one observer, "in whom probably beyond all others, is to be found the greatest mixture of strength and weakness, of truth and falsity, of that which is attractive and that which is detestable." An opponent of the thought and tendencies of his time, he wrote with such force as to attract the attention and change the convictions not only of France, but of Europe.

ROWING, *ro'ing*, the art of propelling a boat over the water with oars. The oar was probably used before the sail. At all events, boats propelled by oars, with rudders for steering, were in use more than 3,000 years before Christ, and the ancient Greeks and Romans traveled in great galleys with rows of oars, one above another manned by slaves.

Rowing as a sport was not recognized until early in the eighteenth century. The first boat race on record occurred in 1715, and amateur rowing as it is known to-day began in England, in 1800. The first boat race between Oxford and Cambridge universities took place in 1829, and since 1856 the con-



JEAN JACQUES
ROUSSEAU

test has been an annual event, except during the World War. Most English boat races are on the Thames, which has always been the favorite resort of amateur oarsmen. The most important English regatta is held annually at Henley, on the Thames. Australia holds an annual regatta, and in Canada rowing has made rapid progress since 1904.

Harvard, Yale and Cornell universities have led in ragattas in the United States, and the annual boat races between the crews of these universities are followed with interest throughout the country. The first races took place in 1843 and 1844, and ten years later the first amateur boat club was organized. The National Association of Amateur Oarsmen was formed in 1873. Occasional international regattas have been held between English and American oarsmen, in which the English have annually been victors.

Boats used in racing are long, narrow and light. Their walls are so thin that the boats are called *shells*. They are built for one, two, four, six or eight men. The best shells have movable seats.

ROWLAND, *ro'land*, HENRY AUGUSTUS (1848-1901), a distinguished scientist, born at Honesdale, Pa., and educated at Rensselaer Polytechnic Institute at Troy, N. Y. He was elected professor of physics in Johns Hopkins University in 1876 and held the position until his death. During his travels in Europe he studied the methods of instruction in different educational institutions and carried on extensive scientific research. To Professor Rowland is due, in great measure, the world-wide reputation of Johns Hopkins University as a great scientific school. Rowland became widely known through his inventions and discoveries in science. He was the originator of the multiple telegraph instrument and also succeeded in making the most perfect photographs of the solar spectrum, that have been secured.

ROYAL GORGE, *gorj*, a famous canyon through which the Arkansas River flows, in Fremont County, Central Colorado. It is eight miles long, and is one of the most picturesque gorges in America. The walls, which rise to a height of about 3,000 feet, are gorgeously colored.

ROYAL INSTITUTION OF GREAT BRITIAN, an organization founded in London by Count Rumford in 1799 "for the promotion, diffusion and extension of science and useful knowledge." Its original pur-

pose was to give the laboring classes information in physics and mechanics, by means of lectures. However, lecturers of such note were engaged that all classes of students were attracted to them. The members are elected by ballot and pay an admission fee and an annual subscription.

The buildings include a library, a laboratory and a museum. In the laboratories some of the most valuable discoveries in chemistry and physics have been made. On the list of lecturers are the names of Huxley, Tyndall and Gladstone.

ROYAL CANADIAN MOUNTED POLICE, the police force of the Canadian Northwest, known throughout Canada as the "mounties." The force was organized in the autumn of 1873, by an act of Parliament, for the purpose of assisting in governing the vast unsettled territory which had been ceded by the Hudson's Bay Company to the Dominion of Canada. The act which established the force provided that all the police were to be mounted and efficiently equipped, but without any finery. "As little gold lace and fuss and feathers as possible" was the motto of Sir John Macdonald. No person was to be appointed to the force "unless he be of sound constitution, able to ride, active and able-bodied, of good character, and between the ages of eighteen and forty years; nor unless he be able to read and write the English or French language." The Canadian Mounted Police was to be a civil force, though drilled in military organization.

From the very beginning it attracted high grade men. University graduates and noblemen have served in the ranks with the humblest. Another important characteristic of the men of the force is that they think for themselves. In the course of a patrol a sergeant may find himself called on to act in almost any capacity. He must be a man capable of meeting emergencies as they arise. Consequently the Canadian Mounted Police has always been a self-reliant, yet well-disciplined, body of men.

Duties. There is hardly a department of Canadian government that is not assisted by these hardy troopers. They act as customs officials along the border. They carry the mails to distant mining camps, they report on the roads, bridges, crops and weather, and they take the census. They help travelers, and they are frequently called on to care for the sick.

Probably the most important duty of the police is to enforce law and order. In many of the remote districts they not only preserve the law, but make it and interpret it. The officers make regular trips throughout their districts to hold court. In tracking down criminals these men have many difficulties. It might seem that in the north, especially in winter, it would be almost impossible to detect a crime and punish the criminal. The records of the police prove the contrary. No detective force in the world can show a better record. No matter how small the crime, "Get the man," is the order. The murderer and the sneak thief are both criminals; though their punishment is different, both must be punished. Time and distance are no object. This attitude, absolute justice to every man, has earned for the mounted police the fear of all evil-doers and the respect and admiration of all good citizens.

Present Organization. As organized in 1922, the force included one commissioner, two assistant commissioners, thirteen superintendents, forty-five inspectors, two surgeons, one veterinary surgeon, 1,163 non-commissioned officers and constables. The Yukon and the Northwest Territories constitute an area of more than 2,500,000 square miles. The remotest detachments are those on Herschell Island, on the shores of the Arctic Ocean, 2,500 miles from headquarters, and at Fullerton, on the northwest corner of Hudson's Bay.

During the World War many hundreds of the force took their discharge to serve in the Canadian and British army. Many of its members rose to high rank, six reaching the rank of general. Owing to the demands upon the force made by the war, it became necessary for it to withdraw from policing the provinces of Alberta and Saskatchewan. In December, 1918, the jurisdiction of the force was extended for Federal purposes to the whole of Western Canada from 86° longitude to the Pacific coast.

ROYAL SOCIETY, THE, a scientific society in Great Britain, the most famous and influential scientific society in the world. In 1664 it began the publication of *Philosophical Transactions*, since 1750 published annually and containing the most valuable record of scientific developments in existence. Important scientific commissions which have been entrusted by the British government to the Royal Society have in-

cluded the direction of the Royal Observatory at Greenwich by Isaac Newton in 1671, the correcting of the calendar in 1752, the protection of British ships from lightning, the measurement of a degree of latitude, the Antarctic expedition under Captain Cook in 1772, the Arctic expeditions under Parry in 1819, Sir John Franklin in 1845 and Nares in 1874, the determination of the density of the earth, the accurate comparison of systems of weights and measures and many other similar undertakings. Several trust funds and a library of 50,000 volumes are in the hands of the Society.

Admission to the Royal Society is difficult to secure, and the F. R. S. (Fellow of the Royal Society), which its members are allowed to write after their names, is a sign of great distinction. Fifteen new members may be admitted each year, and there may be representatives of other countries than Great Britain on the roll to the number of fifty.

RUBAIYAT, *roo bai'yat*. See OMAR KHAYYAM.

RUBBER AND RUBBER MANUFACTURE. Rubber is an elastic gum made from the milky juice of a number of plants which grow in the tropical and semitropical regions of the world. The juice resembles the milk-white sap of the milkweed, and it is barely possible that plants of the milkweed family contain a small quantity of rubber.

How Rubber is Obtained. The hevea tree, which is found in large numbers in the forests of the Amazon, is the chief source from which rubber is obtained. The work is done by Indians. The sap, or latex, as it is called, comes from the inner layer of bark, and the tree is gashed just deep enough to reach this layer. The tool used resembles an ordinary hatchet. First a vertical gash, or channel, is made. Then slanting gashes connecting with this are made on one or both sides. The latex flows down these cuts to the main channel, and a cup is placed at its bottom to catch the fluid. The tapping is done early in the morning, and the latex is gathered a few hours later.

Making the Rubber. A pail of latex looks very much like a pail of milk, and if allowed to stand the rubber will rise to the surface like cream. But the water must be evaporated and the rubber coagulated at once, or the rubber will be injured. The Indian makes a small fire of sticks and palm



THE RUBBER INDUSTRY

1—Native woman tapping rubber tree. 2—Carrying sap to central point. 3—One method of curing or "smoking" rubber. 4—Native tools: (a) for tapping trees; (b) cocoanut shell for carrying sap; (c) cup for catching sap; (d-e) paddles for "smoking." 5—Inspecting for purity. 6—African tree 14 months old. 7—Rubber tree leaves and seed. 8—Some manufactured products.

nuts, over which he places a clay cone having a small opening at the top through which the smoke escapes. He dips a wooden paddle into the latex and holds it in the smoke until the water is evaporated, leaving a thin coating of rubber. The paddle is again and again dipped into the latex and held in the smoke until a ball of rubber so large that it cannot be handled is formed. This ball, called a *biscuit*, is then cut open on one side, and the paddle is taken out. The biscuit is the form in which the crude rubber is placed on the market.

Other sources of rubber are the *castilloa* tree, also found in South America, the rubber trees and vines of the Congo region in Africa, and the *guayule* plant, a shrub that grows in Northern Mexico, some parts of Texas and in Arizona, where large plantations are under successful cultivation. Rubber is obtained from the guayule by grinding the plant, and then subjecting the material to a number of processes.

Rubber Manufacture. When the crude rubber reaches the factory it is run through a washing machine, consisting of a pair of toothed rollers over which water is flowing. The rollers break the rubber up into rough strips, and the water removes dirt and other impurities. The strips of rubber are dried and sent to the mixers, where sulphur and various other substances are mixed with it, to prepare it for the purposes for which it is to be used. Sulphur is the most universally used of all compounds; some of the other substances commonly employed are aluminite, asbestos, zinc oxide, white lead, whiting, china clay, mica and talc. It is at this stage of the manufacture that old rubber reclaimed from overshoes and other discarded rubber articles, is used. From the mixing machine the rubber goes to calenders, or rollers, from which it comes in sheets ready for use.

At no stage of the process is rubber melted. It may be warmed at times, but molded solid rubber goods are pressed into molds, not poured in. For rubber shoes, clothing, belting, hose, tires, etc., the rubber is combined with duck or some other strong fabric. This is done by laying a sheet of rubber on the fabric and pressing the two together between heavy rollers. Cloth for mackintoshes is prepared by laying a thin sheet of rubber between two layers of cloth and pressing them together. Tubing is made by pressing soft rubber through a mold. Rubber bands sold

by stationers are cut from pure rubber hose.

Vulcanizing. Previous to 1839, rubber was considered of little commercial value, because no method of preparing it for practical use had been discovered, and all articles made from it were sticky in warm weather, and hard and brittle in cold weather. In 1839 Charles Goodyear, an American, discovered the process upon which the modern rubber industry largely depends. Goodyear found that by mixing sulphur with rubber and heating it its objectionable features were removed. The process is known as *vulcanizing*, because Vulcan was the ancients' god of fire. The term is now commonly applied to the process of repairing punctures in automobile tires. See GOODYEAR, CHARLES.

Commercial Importance. If we were to enumerate all the articles made of rubber or those into whose manufacture rubber enters, the list would be long. Without rubber, we could not have telephones, bicycles or automobiles as they are now made. Nearly all machines and appliances operated by electricity have some parts made of rubber. Then there are hundreds of small articles, such as combs, hot water bottles, knife handles, buttons, etc., that are so common that we never think of the material which enters into their manufacture. The World War revealed the importance of rubber in war, for it entered into many devices used in military operations.

The rubber industry was first developed in the United States, and that country still maintains its supremacy. Akron, Ohio, is the largest rubber manufacturing center in the world, and it uses nearly one-fourth of the world's supply of crude rubber. Most of the rubber for American manufactures comes from Brazil, Central America and Mexico. Africa and Ceylon supply most of the European mills. The demand for crude rubber has grown so rapidly that rubber plantations in Brazil, Mexico, Ceylon and other tropical countries have become very profitable. The cultivated trees produce more rubber and of a better quality than those growing wild.

History. The Spaniards who followed Columbus to Central America found that the Indians played with balls made from the juice of a tree. These balls were objects of curiosity, because, when they hit a hard object, they would rebound. Without doubt these were rubber balls. Probably the Indians had known of this substance for centuries, but they never made practical use of it. They

called the tree from which rubber is obtained *caoutchouc*, which means *weeping tree*. The name *rubber* was given this peculiar substance by the English chemist Priestley, the discoverer of oxygen. While experimenting with a ball of rubber, Priestley discovered that it would erase lead pencil marks, and so far as known this is the first practical use of rubber by civilized man. The term *rubber* is known only in the English language.

RUBENS, PETER PAUL (1577-1640), the foremost painter of the Flemish school. He was distinguished as a portraitist, a painter of religious and mythological subjects, landscapes and animals, and he was equally successful in depicting the peasant and the beribboned courtier. A courtier himself, with exceptional tact and a fluent use of six languages, he acted many times in a diplomatic capacity when Spain, Holland and England were involved.



PETER PAUL
RUBENS

Rubens was born at the German town of Siegen, Westphalia. His mother was Dutch, and after the boy's father died the family lived at Antwerp. Here Peter Paul studied under the leading masters and in 1598 was himself recognized a "master" and admitted to the painters' guild. Two years later he went to Italy to study the works of the Italian masters, and there entered the service of the Duke of Mantua, for whom he executed numerous paintings and diplomatic services. He returned to Antwerp in 1608, became court painter to Archduke Albert, and the following year married Isabella Brant. He soon became the most sought-for painter in Europe. Commissions poured into his studio, and were arranged years in advance. He was knighted by Charles I of England and Philip IV of Spain. To this period belongs his greatest masterpiece *The Descent from the Cross*, in the Notre Dame Cathedral, Antwerp.

In 1622 Rubens was invited by the queen mother Marie de' Medici to Paris to decorate a gallery of the Luxembourg with allegorical pictures pertaining to incidents in her life.

His wife died in 1626, and four years later he married Helene Fourment, a buxom young woman, who appears on many of his canvases. His life was successful and happy throughout, and his artistic power remained undiminished to the end.

Rubens' productivity was almost incredible. He executed about 1,500 pieces, which are distributed among the leading galleries. While he lacked the delicacy, restraint and grace of the Italians, he was not far behind the greatest Venetians as a colorist; and in the realm of the spectacular he is supreme. Life appeared to him as a pageant and on a large scale, and he had the gift to see the great panorama as a whole and in detail. His principal works include *The Crucifixion* (Antwerp Museum), *Emperor Maximilian I* (Vienna), *Lion Hunt* and *Children with Fruit Garland* (Munich Gallery).

RU'BICON, the river which Julius Caesar crossed with his legion in 49 B. C. when he entered Rome and defied the Republic, whose senate had passed a decree ordering Caesar to disband his army. When Caesar led his army across the river, he virtually declared war against the Republic. From this event the phrase "to cross the Rubicon" has come to mean to take some decisive step which commits one to a hazardous enterprise from which there is no retreat. The river is a small stream in Northern Italy, flowing into the Adriatic.

RUBID'IUM, a rare metal, discovered by Bunsen and Kirchhoff in 1860, by spectrum analysis. It is a white, shining metal, and at ordinary temperatures it is as soft as wax. It is usually found in connection with caesium, and it belongs to the group of the alkali metals.

RUBINSTEIN, *roo'bin stine*, ANTON GRIGORYEVITCH (1830-1894), a famous Russian pianist and composer. He studied at Berlin and Paris, taught for a time at Vienna and finally settled in Saint Petersburg, founded the Saint Petersburg Conservatory of Music and was director of it until 1867. Rubinstein made numerous concert tours of Europe, and in 1872, with the violinist Wieniawski, visited America. He was everywhere recognized as one of the world's greatest performers. His chief ambition, however, was in the field of composition, a field in which he was less successful. He composed chamber music, songs, symphonies, concertos and oratorios. These, while contain-

ing passages of wonderful beauty, have not a uniform excellence, and they are rarely heard to-day on the concert stage.

RUBLE, or **ROUBLE**, *roo'b'l*, a silver coin, the monetary unit of Russia. Its value was standardized in 1897, and remained fixed until the revolution of 1917. Formerly the ruble was equivalent to 100 kopecks and to 51½ cents in United States and Canadian money. Half and quarter rubles of silver were issued, as well as 15 and 7½ ruble gold pieces. After the overthrow of the imperial government the ruble declined steadily in value, and in 1919 the exchange rate was less than one-tenth of what it was originally.

RUBY, or **RED SAPPHIRE**, a precious stone of a deep red color, of which there are two varieties, the oriental and the spinel. The *oriental ruby*, or *true ruby*, is a corundum, formed nearly exclusively of alumina; it is of great hardness, and is a perfect stone, having many times the value of a diamond of the same size, is the most valuable of all precious stones. Oriental rubies are found chiefly in Burma and Siam; inferior specimens have also occurred in North America and Australia. Genuine rubies of small size occur in stream gravels in Macon County, North Carolina. *Spinel rubies* consist of an aluminate of magnesium and are much inferior to the true rubies in hardness and value. They are found in Burma, Ceylon and Australia. The ruby is the birthstone for July. See PRECIOUS STONES.

RUDE, **FRANÇOIS** (1784-1855), one of the leading French sculptors of the nineteenth century, born at Dijon and educated at Paris and at Rome. After about twelve years spent in Brussels, he settled at Paris where, in 1828, he exhibited his *Mercury Fastening His Sandal* and shortly afterwards the *Neapolitan Fisher Boy*, both of which are now in the Louvre. Following there came a series of masterpieces which gave him rank among the greatest of French sculptors. He was equally at home in classic fields and in the modern realistic school, as his *Hebe and the Eagle*, *Amor Victor*, *Fisher Boy* and *Joan of Arc* bear witness. Rude executed a number of portrait statues and civic pieces, chief of which is a group entitled *The Departure*, representing the departure of volunteers from Paris in 1792.

RUFF, a species of sandpiper, from ten to twelve inches in length, which varies greatly in color, being principally brown, with

white on the wings and belly. In the breeding season there appears on the neck of the male a group of long plumes, which when raised, form a kind of ruff, which has given its name to the bird. During the same season the male is disposed to fight any approaching bird or enemy. The females, who are more uniform and modest in coloring and lack the ruff, are called *reeves*.

RUFFO, *ru'fo*, **TITTA**, an Italian baritone, pupil of Cassini of Milan, popular in both lyric and dramatic rôles. He has toured Italy and South America and has appeared with success in New York and Chicago. Among his greatest achievements are his rôles in *Pagliacci* and *Hamlet*.

RUG'BY SCHOOL, the most famous of the English public schools, was established at Rugby in 1567 by the will of Lawrence Sheriffe, a Rugby grocer. Because of litigation over the will, the school remained in obscurity during the first century of its existence, and during the next century it gained but little. Its wide reputation is due to the work of Thomas Arnold, who became head master in 1829 and completely revolutionized the system of instruction and discipline, placing both upon a much higher plane than English schools had previously known. Arnold's successors have followed his plan, and the school now takes high rank among English institutions. The course of study gives most attention to classics, but includes science, modern language and mathematics. The number of students is about 600. The best description of life in this school during Arnold's administration is found in *Tom Brown's School Days*, by Thomas Hughes.

RUGS, floor coverings divided into two classes, known as *Oriental*, and *domestic rugs*. Orientals are the most durable and valuable of all rugs, and they are very expensive. See **ARNOLD, THOMAS**.



RUFF

Varieties of Oriental Rugs. The date of the origin of the making of Oriental rugs is lost in antiquity. The similarity in forms and inscriptions of ancient Egyptian architecture to the designs characteristic in the modern Oriental rug connects the art of rug weaving with that remote era. Oriental rugs are now generally divided into six groups, known as Persian, Bokhara, Turkish, Caucasian, Chinese, and Indian; each group has its subdivisions, the rugs taking the names of the districts and towns where they are woven.

The finest rugs made in the world, representing the most perfect conventionalization of flowers, leaves and other vegetation, come from Persia. No others can stand favorable comparison with the exquisite *Ispahan* creations of the sixteenth century, with their gorgeous foundations of Ispahan red with varied floral designs and fine tracings of puzzling, fascinating lines. Only a few perfect specimens now are counted among the treasured possessions in private collections. The most notable weaves of Persian rugs include the Kashans, the Kirmans, the Kurdistans, the Saruks, the Hamadans, Shirazes and Shenass. Both wool and cotton are employed in their weaving.

The Bokhara group, made in Central Asia, are distinguished by their very wide selvages and long fringes; their motifs are large and geometrical and are in dark red, outlined with black or white.

Caucasian rugs, also with uniform geometrical designs, are lighter in tone than the Bokharas. They are knotted rather than woven. The best-known weaves are the Daghestans, Shirvans, Kazaks, and Soumaks.

Turkish rugs are not so extremely rectilinear as the Caucasian rugs, the Ghiordes, Kulah, Melez and Bergamo being the most familiar. Most of the modern rugs now made in Turkey are of inferior type, excepting the very large examples from Persian wools woven in the sultan's works at Hereke.

Chinese rugs are very individual, with their dragons, unique varieties of the lotus flowers and odd geometrical designs distributed on harmonious grounds of gray, blue, yellow, or cream. The warp of Chinese rugs is always cotton. Fine examples of Indian rugs come from Tanjore and Benares; they are distinguished by their medallion centers.

The Prayer Rug. The prayer rug, which all devout Mohammedans always carry with them, is one of the most pronounced patterns

in Oriental rugs. Upon this rug the worshipper performs his devotions, his face and the point of the pattern being turned toward Mecca.

European and Domestic Rugs. The most familiar European rug is the *Brussels*, sold either as a rug, or "art square," as it is sometimes called, or as a carpet. Originally made in Brussels, it was copied in England, whence it was introduced into America. The *Wilton*, manufactured first in Wilton, England, is also made in Oriental patterns and has a

(Accompanying Article Rulers of the World, page 3131)

COUNTRY	RULER	ACCESSION	TITLE
Abyssinia.....	Waizeru Zauditu	1916	Empress
Afghanistan.....	Amanulla Khan...	1919	Amir
Argentina.....	M. T. de Alvear...	1922	President
Austria.....	Michael Hainisch...	1920	President
Belgium.....	Albert I.....	1909	King
Bolivia.....	B. Saavadra.....	1921	President
Brazil.....	Art. Bernardes.....	1922	President
Bulgaria.....	Boris III.....	1918	King
Chile.....	A. Alessandri.....	1920	President
China.....	Tsao Kun.....	1923	President
Colombia.....	Pedro N. Ospina.....	1922	President
Costa Rica.....	Julio Acosta.....	1920	President
Cuba.....	Alfredo Zayas.....	1921	President
Czecho-Slovakia.....	Thos. G. Masaryk...	1920	President
Danzig.....	M. S. MacDonnell...	1923	High Com.
Denmark.....	Christian X.....	1912	King
Ecuador.....	José L. Tamayo.....	1920	President
Egypt.....	Fuad I.....	1917	King
Estonia.....	K. Kukk.....	1922	State Head
Finland.....	E. J. Stahlberg.....	1919	President
France.....	Gaston Doumergue...	1924	President
Germany.....	Friedrich Ebert.....	1919	President
Great Britain.....	George V.....	1910	King
Greece.....	Adm. Koundouriotis...	1924	Regent
Guatemala.....	José M. Orellana.....	1922	President
Haiti.....	Louis Borno.....	1922	President
Hedjaz.....	Hussein.....	1916	King
Honduras.....	R. L. Gutierrez.....	1920	President
Hungary.....	Nicholas Horthy.....	1920	Regent
Italy.....	Victor Emmanuel III.....	1900	King
Japan.....	Yoshihito.....	1912	Emperor
Latvia.....	J. Tschakste.....	1923	President
Liberia.....	C. D. B. King.....	1920	President
Lithuania.....	A. Stulginskis.....	1920	President
Luxembourg.....	Charlotte.....	1919	Grnd. Duch.
Mexico.....	Albero Obregon.....	1920	President
Netherlands.....	Wilhelmina.....	1898	Queen
Nicaragua.....	D. M. Chamorro.....	1921	President
Norway.....	Haakon VII.....	1905	King
Panama.....	Belisario Porras.....	1920	President
Paraguay.....	Eusebio Ayala.....	1921	President
Persia.....	Sultan Ahmad.....	1909	Shah
Peru.....	Agusto B. Leguia.....	1919	President
Poland.....	S. Wojciechowski.....	1922	President
Portugal.....	Jose de Almeida.....	1919	President
Rumania.....	Ferdinand I.....	1914	King
Russia.....	Alexis Rykoff.....	1923	Pres. Coun.
Salvador.....	Alfonso Quinonez.....	1923	President
Santo Domingo, Serb, Croat, and Slovene State	Juan B. Vicini.....	1922	President
Siam.....	Alexander I.....	1921	King
Spain.....	Rama VI.....	1910	King
Sweden.....	Alfonso XIII.....	1902	King
Switzerland.....	Gustaf V.....	1907	King
Turkey.....	Karl Scheurer.....	1923	President
Uruguay.....	Reouf Bey.....	1923	President
United States.....	José Serrato.....	1923	President
Venezuela.....	Calvin Coolidge.....	1923	President
	Juan V. Gomez.....	1922	President

velvetlike surface. The *Axminster*, likewise named after a small English town where it was first manufactured, is a comparatively inexpensive yet attractive copy of Turkish designs. A variety of *Axminster*, known as *Smyrna*, with the nap, or pile, on both sides, is now extensively manufactured in the United States.

RUISDAEL, *rois'dale*, JACOB VAN. See RUYSDAEL, JACOB VAN.

RULERS OF THE WORLD. The table on page 3130 lists the rulers of the world in 1923. A comparison of this list with a similar one before the World War shows the growth of the sentiment for democracy. Among the great powers, Austria-Hungary disappeared as a government, to be replaced by republics. Germany and Russia changed from autocratic to democratic forms of government, and various new republics were erected out of territory formerly under autocracies.

RUM, a strong alcoholic liquor, obtained by distilling molasses and the refuse derived from the manufacture of cane sugar. Pure rum is colorless. Its brown tint is imparted to it by the addition of caramel and by storing it in casks that have contained sherry. Most of the rum is manufactured in the West Indies, and the name *Jamaica rum* is applied to the best grade, regardless of its place of manufacture. The strength and quality improve with age. Rum contains a large percentage of alcohol, and can therefore no longer be manufactured or sold in the United States and Canada.



ROMANIA, a kingdom in the southeastern part of Europe, one of the several nations of that continent which have achieved national independence by throwing off the Turkish yoke, Rumania has been a free country since the Russo-Turkish War of 1877-1878. At that time it included the former principalities of Moldavia and Wallachia (united in 1861), and the district known as the Dobruja, which was ceded by Bulgaria. By the Treaty of Bucharest (August, 1913), at the close of the Balkan Wars, Rumania acquired an addi-

tional territory of 2,969 square miles, and at the outbreak of the World War in 1914 its total area was 53,489 square miles, about the same as that of the state of Arkansas.

Rumania lies north of Bulgaria and west of the Black Sea. In the extreme west it is separated from the Serbia of 1914 by the Danube River. Before the dissolution of the Austro-Hungarian monarchy in 1919 it was bounded by Austria-Hungary on the west and north, the two being separated by the Carpathian Mountains. It also touched Russia on the north and was separated from that country on the east by the Pruth River. The outcome of the World War, in which Rumania fought with the entente against the Germanic alliance, resulted in an enlargement of Rumanian territory and a change of the boundaries adjoining former Austria-Hungary and Russia. Rumania claimed or was promised Transylvania and the Banat of Temesvar, which had belonged to Hungary; Bukowina, an Austrian crownland, and Bessarabia, in the extreme southwest of Russia. Rumanian possession of the Banat was disputed by the Jugo-Slavs, and the Ukrainians claimed Bessarabia and Bukowina. The permanent boundary lines of Rumania were to be decided by the League of Nations.

The People. The population of Rumania at the outbreak of the World War was 7,508,000. Nine-tenths of this number were Rumanians, and the rest were Jews, gypsies, Bulgarians, Serbs, Germans, Hungarians, Turks and Armenians. There are several million Rumanians inhabiting Transylvania, the Banat, Bukowina and Bessarabia, and it is on this fact that Rumania based its claim to the territories in question. The Rumanians are not Slavs. They claim to be direct descendants of the Roman colonists sent by the Emperor Trajan into the province of Dacia (modern Rumania), but authorities regard them as a mixture of the original inhabitants of the region with Romans, Teutons, Slavs and Mongols. Their language is derived from the Latin, and is more like Italian than any of the other Romance languages. Orthodox Greek is the state religion.

Government and Education. The government is a constitutional monarchy, the throne being hereditary in the male line of descent. The king is assisted by a Cabinet consisting of eight Ministers and a Premier, who is the president of the council. The legislative power is vested in a Senate and a Chamber

of Deputies, the members of each being chosen by ballot. The Senate consists of 120 members, elected for eight years, and the Chamber of Deputies, of 183 members, elected for four years. Education is free and compulsory, but there are not enough schools as yet to take care of the population. However, conditions are improving, and the former high rate of illiteracy is slowly being reduced. There are two universities, located at Bucharest, the capital, and at Jassy.

Physical Features. The Carpathian Mountains form most of the boundary between Rumania and Transylvania and constitute an unbroken barrier. Spurs of these mountains extend into the country for short distances, but in the main Rumania is an extensive low plain. The northern portion is occupied by a tableland, which slopes toward the south and in which the rivers have worn deep channels. The southern part of the country slopes from the Carpathians, or Transylvanian Alps, toward the Danube. The eastern portion, along the Danube, is low and marshy and rises but little above the level of the sea. The Danube forms most of the southern boundary and that portion of the western boundary which separates the country from Serbia. Near the eastern end of Rumania the Danube flows northward and then again eastward into the Black Sea. The Dobruja is that portion of the country lying south and east of the river. The important tributaries of the Danube are the Aluta, the Dinbowitza and the Jalomitza, draining the southern part of the country; and the Sereth and its tributaries, draining the northern part.

The climate is similar to that of the adjoining portion of Russia. The winters are intensely cold, the thermometer sometimes falling as low as 20° below zero. The summers are hot, and the rainfall is irregularly distributed throughout the year, being heaviest in June, while the late summer months are usually dry. The mean annual temperature at Bucharest is 51°, and the mean temperature for July, 73°.

Resources and Industry. The country is rich in minerals. Gold is found in the beds of some of the streams. There are also ores of iron, lead, clay, silver, copper and manganese, and deposits of coal. Salt is found in large quantities and has been mined for ages. Marble of excellent quality occurs, as do clay and sand suitable for glass and porcelain ware. These and common building

materials are widely scattered over the country. The most valuable mineral is petroleum. In the Carpathian foothills are some of the most profitable oil fields in the world, and though the wells were seriously damaged during the war, their reconstruction was begun as soon as Rumania was cleared of German forces. Before the war their output was about 1,750,000 tons a year.

The lowlands are covered with a fertile soil, and agriculture is the leading occupation, giving employment to about eight-tenths of the population. Rumania is one of the most important grain-producing countries in Europe and raises large quantities of wheat and Indian corn, the annual crop of the former being about 90,000,000 bushels and of the latter, about 110,000,000 bushels. Barley, rye and oats are also produced in quantity. Grapes and other fruits are grown in the foothills of the mountains and large quantities of wine are made. Prunes are also extensively cultivated. Considerable attention is given to the raising of live stock, and large numbers of horses, cattle, sheep and swine are grown and exported.

Before the World War the peasants owned about one-third of the arable land, the rest being in the hands of large proprietors, who rented it out in small sections. This system was the source of much discontent, and tended to create a feeling of hostility between the peasants and the proprietors. In February, 1919, the Rumanian Parliament passed a land reform measure whereby the large estates were divided among the peasants, making Rumania a country of small farmers. The former proprietors, who were permitted to retain only fifteen per cent of the arable land, were assured a yearly income from the state as recompense for giving up their holdings.

There are nearly 7,000,000 acres of forest land, the principal trees including oak, beech, pine, fir, maple and elm.

Rumania is not a manufacturing country in the modern sense of the term. There are many flour mills and oil refineries, but most of the manufactured products needed by the population are imported or made in limited quantities in the homes.

Transportation and Commerce. The Danube is the chief waterway, and it serves as an important means of transportation for the produce of the country. Lines of railway also extend through the country from the

north to south and from east to west and connect its leading cities with those of neighboring countries. There are about 2,400 miles of railway, most of which is owned by the government. The exports consist of wheat, corn, wine and other agricultural products; and the imports are manufactured goods, machinery and such foodstuffs as are not profitably grown within the country.

History. The territory now included in Rumania was occupied in ancient times by a people called Dacians, and formed a part of the Roman Province of Dacia. During the Middle Ages the independent principalities of Moldavia and Wallachia were organized out of the territory. Later these became tributary to Turkey, but during the nineteenth century Russian aggression brought them under the influence of the czar. The Rumanians endeavored to secure their independence, and after the Crimean War the two principalities united in 1861, but continued tributary to Turkey until the Berlin Treaty in 1878, when the European powers acknowledged their independence. Soon after, the present government was organized. Rumania did not take part in the first Balkan War against Turkey, but it sided with Serbia and Greece in the second phase of the struggle against Bulgaria, and was rewarded by receiving nearly 3,000 square miles of territory formerly belonging to Bulgaria. This territory was formed into the two districts of Caliaera and Duroster.

In October, 1914, King Charles, the Rumanian sovereign, died, and was succeeded by his nephew, Ferdinand. In August, 1916, Rumania entered the World War by declaring war on Austria-Hungary, and began an offensive into Transylvania. The German staff sent Von Mackensen and Von Falkenhayn to direct a counter-offensive, and, attacked by Germans, Austrians and Bulgarians, the Rumanians were soon swept back, while the enemy not only cleared Transylvania but occupied Wallachia and the Dobruja. Rich stores of grain and oil fell into German hands and helped relieve the desperate economic situation in the central empires. In November Bucharest was abandoned by the Rumania government, which removed to Jassy, in Moldavia.

Though crushed, Rumania remained loyal to the allies, and withdrew from the war only when the Bolshevik government of Russia made peace with Germany, leaving the

smaller country helpless. It is known that Rumania's untimely entrance into the war and its speedy collapse were the result of an intrigue between Germany and the treasonable reactionaries who had control in Russia before the downfall of the czar. Betrayed by the old Russian government and deserted by the new, Rumania signed a peace treaty with the central powers on May 6, 1918, which, if carried out, would have left the nation practically a vassal state. The subsequent collapse of Germany prevented this result, and in the fall of 1918 the Rumanians saw their country cleared of the enemy. By the treaties of 1919 Rumania was enlarged by the addition of Bessararabia, Bukovina, Transylvania and other territory. A new constitution enacted by the Constituent Assembly in 1920 reorganized the government, giving the people larger representation. The Cabinet, appointed in January, 1922, proceeded to formulate a vigorous reconstruction policy, based on universal suffrage and land reform.

Related Articles. Consult the following titles for additional information:

Balkan Wars	Danube
Bessarabia	Dobruja
Bucharest	Jassy
Bukowina	World War

RUMELIA, *ru mel'ia*, the name formerly given to a division of Turkey, in Europe, which comprised ancient Thrace and a part of Macedonia. The name signifies "the land of Rome" and was given to the country because when the Mohammedans conquered the Byzantine they considered the inhabitants of this section of Europe Romans.

RUMINANTS, the name of that order of animals that chew the cud. Cattle, sheep, goats and deer are the most common representatives of the order in America. The camel, the antelope and the llama also belong to the order, which includes nearly all of the most useful domestic animals. With the exception of the camel, the ruminants have no incisors or cutting teeth in the upper jaw. When a cow or a sheep feeds it thrusts out its long tongue, seizes a bunch of grass and tears it off, and this mouthful of grass mixed with saliva is swallowed into the first stomach. Later, when the animal is resting, this food is brought upward into the mouth in small quantities and thoroughly masticated between the large molar teeth. The food is then swallowed into the second stomach, where it is digested. All ruminants have

hoofs, and they belong to the division *Ungulata*, or hoof-bearing animals.

RUMP PARLIAMENT, in English history, the name given the remnant of the Long Parliament after the majority of its members had been expelled by Cromwell's soldiers under Colonel Pride, in 1648. Only sixty members remained, and these in conjunction with the army brought about the condemnation of Charles I. These members constituted the *rump*, and the body was ever after known as the *Rump Parliament*. It was forcibly dissolved by Cromwell in 1653 for opposing the demands of the army. It was reinstated twice later, but for only brief periods. In March, 1660 it decreed its own dissolution.

RUNES, *roons*, the earliest written characters of the ancient Teutonic people of Northwestern Europe. They are formed almost invariably of straight lines, and are found engraved on monuments, tombstones, rings and weapons. Occasionally a manuscript of later date contains them. Traces of runes are found in those parts of England that were first conquered by the Angles and Saxons, especially in Northumbria, Mercia and East Anglia. Runic inscriptions abound in Scandinavia, Denmark and Iceland.

The origin of these characters is not known, but Anglo-Saxon tradition ascribes their invention to Odin. Instruments and weapons bearing runic inscriptions dating from A. D. 300 to 400 have been found in Norway. The name is believed to be the same as the Anglo-Saxon word *run*, meaning *mystery*. The inscriptions were associated with the magical rites of heathen worship; for this reason their use was forbidden by the early Christians, and they were gradually forgotten. The latest runic inscriptions in Sweden date from about 1450.

RUNJIT SINGH, *run jeet' Sing'h*, (1780-1839), maharaja of the Punjab, India, and founder of the Sikh kingdom. His father, a Sikh chieftain, died in 1792, and the government fell into the hands of his mother. At the age of seventeen, however, Runjit rebelled against his mother's authority and assumed the power himself. The shah of Afghanistan granted him possession of Lahore, which had been taken from the Sikhs, and Runjit soon subdued the small Sikh states to the north of the Sutlej. The chiefs to the south of that river invoked the protection of the British, who made an arrangement with Runjit in

1809, accepting the Sutlej as the south boundary of his dominions. The ambitious prince now organized his army after the European model, with the help of French and English officers, and steadily extended his power, assuming the title of raja in 1812. His boundaries continued to widen until, by 1819, he was ruler of the entire Punjab, with title of maharaja, or king of kings. In 1836 he suffered a heavy defeat from the Afghans, but he retained his power until his death.

RUNNIMEDE, the meadow on the right bank of the Thames, in Surrey, England, four miles below Windsor, where King John met the barons who compelled him to sign Magna Charta, June 15, 1215. The actual signing is said to have taken place on Magna Charta Island, opposite Runnimede. A race course now occupies the site of Runnimede. See **MAGNA CHARTA**.

RUPEE, the unit of value in the monetary system of British India. The weight of a rupee, 180 grains (troy), 165 grains of which are of pure silver, is fixed by the British government. The value of the coin as currency, which formerly fluctuated, is also fixed at the equivalent of thirty-two cents in United States or Canadian money. One-sixteenth of a rupee equals an *anna*. Other denominations are half-rupees, quarter rupees and eighth rupees. A *lakh* equals 100,000 rupees; a *crore*, 100 lakhs.

RUPERT'S LAND, the name formerly applied to a vast tract of land bordering on Hudson Bay and then belonging to the Hudson's Bay Company. The territory was granted to the Hudson's Bay Company by Charles II of England, and was held by them until 1869, when the title was surrendered to the British government. In 1870 the title was transferred to the Dominion of Canada. The boundaries were never definitely determined. The territory was formerly known as *The Canadian Northwest*. That portion of it north of the organized provinces is now known as the *North West Territories*. Rupert's Land was named for Prince Rupert, the first governor of Hudson's Bay Company.

RUP'TURE. See **HERNIA**.

RURAL CREDITS. The Federal Farm Loan Act became effective July 17, 1916. It provides for a national system of rural credits in the United States on the following plan:

The Federal Farm Loan Board. A Federal Farm Loan Board, consisting of five

members, of whom the Secretary of the Treasury is *ex officio* chairman, is established in the Department of the Treasury at Washington, D. C. Four members are appointed by the President, with the advice and consent of the Senate; their term of office is eight years, and not more than two members can belong to the same political party. The members devote their entire time to the work of the Board and receive an annual salary of \$10,000 each. No member of the Board shall, during his term of office, "be an officer or director of any other institution, association or partnership engaged in banking, or in the business of making land mortgage loans or selling land mortgages." One of the members is designated as Farm Loan Commissioner.

Federal Land Banks. The United States, exclusive of Alaska, is divided into twelve districts, known as Federal land bank districts. There is a Federal land bank in each district, and each Federal land bank may, subject to the approval of the Federal Farm Loan Board, establish branches within its district. Each bank is under the management of a board of directors, who choose from their own members a president, a secretary and a treasurer. When the subscription to the stock of any Federal Land Bank amounts to \$100,000 a permanent board of nine directors is chosen; six are chosen by the national farm loan associations of the district, and three are appointed by the Federal Farm Loan Board.

Before beginning business each Federal Land Bank is required to have a capital of at least \$750,000. The capital stock is divided into shares of five dollars. This stock may be held by any individual, firm, corporation, or by the government of any state or of the United States. Stock held by national loan associations cannot be transferred.

National Farm Loan Associations. Persons desiring to borrow money on farm mortgage security are required to form organizations known as national farm loan associations. Articles signed by those forming the association are filed with the Federal Land Bank for the district. Each association chooses its own board of not less than five directors. The board of directors chooses a secretary-treasurer, who is the executive officer of the association. The other officers are a president, a vice-president and a loan committee of three members.

The secretary-treasurer collects and receives all money due the association, such as

interest, partial payments on loans, and principal, and forwards the money to the Federal Land Bank of the district in which the association is located.

Only farmers or those about to become farmers can become members of national farm loan associations. Each member is required to subscribe for stock in the association to the amount of five per cent of the loan for which he applies.

How Loans are Secured. 1. A farmer wishing a loan should join the nearest national farm loan association, paying in \$5 for one share for every \$100 he wishes to borrow.

2. He should make application to the association for the loan, giving his personal note therefor, secured by a first mortgage on his land.

3. The land is examined, and if his application is approved the Federal Land Bank forwards the money to the secretary-treasurer of the association, who pays it over to the farmer.

No commission brokerage is charged the farmer, and his rate of interest cannot exceed six per cent.

Restrictions. No loan will be granted for less than \$100 nor for more than \$10,000. In any case the loan cannot exceed fifty per cent of the value of the land and twenty per cent of the buildings and other improvements included in the mortgage.

Loans will not be made on land not occupied or tilled by the owner. They are granted for the following purposes:

- (a) To purchase land for agricultural purposes.
- (b) For equipment, fertilizer and live stock.
- (c) For improving and erecting buildings.
- (d) For the discharge of a prior mortgage.

The borrower is required to use the money for the purposes for which it was loaned.

Advantages. The rural credit system offers the farmer the following advantages:

1. It enables the farmer to borrow money, within the limits of his security, at fair rate of interest and without having to pay high commissions.

2. It provides for long-time loans—not less than five nor more than forty years—on a plan of easy yearly payments, so when the loan falls due the final payment will be small.

RURAL HIGH SCHOOL. See HIGH SCHOOL.

RUSH, a plant of the sedge family, which grows in marshes and on the banks of streams and ponds. The smooth, leafless stems grow

to a height of three feet. They are tough and flexible and are used in making baskets, chair-bottoms and mats. The various species of rush are found in swampy places the world over. See HORSETAIL RUSH; BULRUSH.

RUSKIN, JOHN (1812–1900), one of the most eminent English art critics, authors and social reformers of the nineteenth century, was born in London. His parents were Scotch, and they attended carefully to his education. He studied at Christ Church, Oxford, and before his graduation won the Newdigate prize for his poem *Salsette and Elephantia*. In 1843 he produced the first volume of his *Modern Painters*, a great work on art criticism. Other volumes appeared at intervals during the next seventeen years. *The Seven Lamps of Architecture* and *Stones of Venice*, criticisms on architecture, followed.

In 1860, with the publication of *Unto this Last*, Ruskin appeared as a social reformer; and he engaged actively in the work which he championed in his writing. He improved the condition of several tenement houses, had streets cleaned and, in fact, devoted the greater part of his fortune to the improvement of the working classes. From 1871 to 1879 and from 1883 to 1884 he was Slade professor of art at Oxford, but was obliged to resign on account of ill health.

Besides the works already mentioned, Ruskin wrote, among others, *Fors Clavigera*, a series of letters to the workmen of England; *Poems*; *Sesame and Lilies*; *Ethics of the Dust*; *The Crown of Wild Olive*; *The Queen of the Air*; *Mornings in Florence*, and *Praeterita*. Eloquence, force and subtle analysis are the prevailing characteristics of Ruskin's literary style, and his works are permeated with a lofty enthusiasm for truth and beauty and with a generous sympathy for the poor and the weak. He is most widely known among children for his beautiful fairy tale *King of the Golden River*.

RUSSELL, ANNIE (1864–), in the generation now passing, one of the leading American actresses, born in Liverpool, Eng-

land, but taken to the United States in early childhood. Her parents were Irish. Miss Russell's first stage appearance was at the age of eight, in Montreal, Canada; not until 1881 did she achieve success in the United States, when she appeared in *Esmerelda* in New York City. Seven years later she began a London career, and in 1904 she was married to Oswald Yorke, an English actor. Her time thereafter was nearly divided between American and English engagements. Among her greatest successes are numerous Shakespearean revivals.

RUSSELL, JOHN, Lord, Earl Russell (1792–1878), an English statesman, the son of the Duke of Bedford. Educated at a private school and at Edinburgh University, he entered Parliament in 1813, before attaining his majority. In 1819 he made his first motion in favor of parliamentary reform, the great question of which he was the champion through life. His influence in the Liberal party steadily increased, and though temporarily unseated in 1826, owing to his advocacy of Catholic emancipation, he carried a motion in 1828 against the Test Acts and thus led to their repeal. In 1831 he was paymaster-general in Lord Grey's administration, and though not in the cabinet, he introduced the first Reform Bill to the House of Commons. In the exciting struggle that followed, Lord Russell was popularly accepted as the great champion of reform. In Lord Melbourne's second cabinet, Russell was home secretary, and in 1839 he became a colonial secretary. From 1841 till 1845 he led the opposition against Peel (See PEEL, SIR ROBERT), with whom, however, he was in sympathy on the Corn Law Question; and when Peel resigned in 1846, Russell formed a ministry which remained in power until February, 1852. He reëntered office in December, 1852, as foreign secretary under Lord Aberdeen, and in 1855 he became colonial secretary in Lord Palmerston's cabinet. He represented Great Britain at the Vienna Conference.

A period of rivalry between Russell and Palmerston ensued, which, however, ended in 1859, when the former became foreign secretary under his old chief, through whom he was raised to the peerage in 1861. In 1865 Russell succeeded Palmerston in the leadership of the Liberal party, but when his new reform bill was rejected in 1866, the Liberals resigned. Thenceforward Earl Russell held no office.



JOHN RUSKIN

RUSSELL, LILLIAN (1861-1922), an American actress and light opera singer, born at Clinton, Iowa. Although she had appeared earlier in amateur theatricals, she made her first professional appearance at eighteen, in *Pinafore*. She became prima donna of the McCaull Opera Company and later, as head of her own company, presented *Virginia and Paul*, *Polly*, *The Queen of Brilliants*, *Fiddle-dee-dee*, *Lady Teazle*, *The Butterfly*, one of her foremost successes, and *Wildfire*. She was later seen in vaudeville, but retired from the stage after her marriage, in 1912, to A. P. Moore, owner and editor of the Pittsburgh *Leader*. In 1918 she appeared again briefly in musical comedy.

RUSSELL, SOL SMITH (1848-1902), an American actor, born in Brunswick, Maine. As a drummer boy he was with the Federal army during the Civil War, and after the close of the war he began to play small parts. At Saint Louis, in 1865, he achieved his first real success, and two years later joined Augustin Daly's company, rising to stellar heights in 1880 in *Edgewood Folks*. His greatest success was won in *Peaceful Valley*, *A Poor Relation* and *A Bachelor's Romance*—plays written for him and well suited to convey the sentiment and comedy and the gentle and whimsical moods which this actor so admirably expressed.

RUSSELL SAGE FOUNDATION, an institution founded in 1907 by Mrs. Russell Sage, who gave \$10,000,000 for its endowment. The purpose is "the improvement of social and living conditions in the United States of America," but it does not seek to improve conditions by merely relieving distress. Its object is to remove the causes of poverty and distress. The work of the Foundation is carried on by departments. The most important departments are those of Charity and Organization; Child Helping; Remedial Loans; Recreation, and Education. The Department of Recreation has done much to further the use of school buildings as social centers. The Department of Remedial Loans has been active in exposing the methods of loan sharks.

The Russell Sage Foundation House Company has constructed at Forest Hills Gardens, on Long Island, a number of attractive and convenient houses at remarkably low prices. These are rented to families of moderate income. In this way the Foundation is trying to solve the housing problem in a large city.



Peasant in Sabbath garb

RUSSIA, *rush'a*, the fatherland of the greater portion of the Slavic race. In 1914, the year which witnessed the outbreak of the World War, the name Russia stood for a great empire in Europe and Asia, extending from the Baltic Sea to the Pacific Ocean, and ruled by a czar who held dominion over one-sixth of the land area of the globe. This name stood also for despotism; for oppression of the masses; for the exiling of lovers of freedom; for the rule of the

privileged classes, who represented but a small fraction of the population. Farsighted observers knew that a Russian upheaval was coming sooner or later, but outbreak of the World War, in which Russia's Slavic millions rallied to the defense of their friends in the Balkans, seemed to unite the people and to check the smoldering fires of revolution. The war, however, could not indefinitely postpone the rising of the masses. The storm broke early in 1917; then followed the downfall of the imperial government, and a long period of desperate suffering on the part of the people, as they struggled to reconstruct their nation.

In April, 1919, Premier Lloyd George, in a speech in the British House of Commons, said in respect to Russia:

"You are dealing with a nation which, after being misgoverned for centuries, has been defeated and trampled to the ground, largely through the corruption, inefficiency, and treachery of its governments. Its losses have been colossal. All that largely accounts for the frenzy that has seized upon that great people. That is the reason why the nation is going through untold horrors of a fanatic and lunatic experiment."

The "fanatic experiment" to which the Premier referred was the rearing of a government based upon the rule of the working classes, with the elimination of the aristocracy and the middle class. This system, commonly called Bolshevism, was established in Russia in the fall of 1917, after a moderate Socialist régime had failed. The significant thing for the rest of the world is that the Russian idea of the rule of the "proletariat"

was accepted by radicals in nearly all other countries, and a movement was started to bring about a world revolution. As for Russia itself, its condition after 1918 can best be described as one of political chaos. To understand what took place the reader should get a view of the former empire.

Old Russia. The area and population of the Russian domain at the outbreak of the World War are shown in the table:

DIVISION	Sq. Mi.	POPULATION
Russia in Europe	1,997,310	149,764,000
Russia in Asia	6,294,119	29,141,500
Finland	125,689	3,277,100
Internal Waters	347,468	
	8,764,586	182,182,600

Russia in Europe extended from the Arctic Ocean to the Black and Caspian seas, and from the Ural Mountains to the Baltic Sea and the former boundaries of Germany and Austria-Hungary. It occupied over half of the continent, and was about two-thirds as large as the United States. Russia in Asia included Siberia, the Steppes Provinces, Turkestan and Transcaspia. In this vast empire there was a great diversity of races and peoples, not only in the Asiatic portion but in the European. In Asia the czar ruled over 6,000,000 Russians, and numerous Armenians, Mongols, Persians, Turkomans,

Revolutionary Russia. When the czar was overthrown the empire began to disintegrate. It had been kept intact by force, and its diverse peoples had no bond of loyalty or of common interest to hold them together. This process of disintegration proceeded very rapidly under the régime of the Bolsheviks, though the Bolshevik leaders raised and trained a great army to hold their dominion over the new nations fringing the central region of European Russia. By the summer of 1919 they still held sway over several million of Great Russians inhabiting the central region. In March, 1918, they had transferred the seat of government from Petrograd to Moscow, because of its central location. There was another reason, also, for this removal. Petrograd was too near the frontier allied nations would not react unfavorably upon the new government. Indeed, it was feared its leaders might be captured by opposing Russians.

In the extreme north, at Archangel, an anti-Bolshevik government was being maintained through military assistance of the allies, chiefly Great Britain. Along the Baltic Sea the provinces of Esthonia, Courland and Livonia were struggling to maintain themselves as independent republics, fighting valiantly against Bolshevik troops and economic chaos. Lithuania, south of the Baltic provinces, and Finland were in an equally precarious state. The Russian Poles, joining cause with their kinsmen in Austria and Prussia, had reconstructed the old Polish state and proclaimed an independent republic, but new Poland was forced to fight on all fronts, owing to boundary disputes with the Ukrainians, Czechoslovaks and Germans, and the efforts of the Bolsheviks to extend their system over the country. The Ukraine, which had previously set up an independent government, was partially reconquered by the Bolsheviks in the spring of 1919. The Cossacks in the southeast and those in the Ural Mountains region kept up a desperate struggle to prevent the extension of Bolshevism into their territory, while Siberia was protected from a Bolshevik invasion by the Russian forces of Admiral Kolchak and Czechoslovak troops. Siberians and Cossacks fought together along the Ural River. In other words, after 1918 European Russia became a discordant nation fighting small wars on its outer edges over thousands of miles of front. Its ultimate boundaries and the fate of the young nations established

PEOPLE	NUMBER	LOCATION
Great Russians	65,000,000	Center of European Russia; also in north and east
Little Russians	20,000,000	The Ukraine, north of the Black Sea
White Russians	6,000,000	Four governments in the west
Cossacks (Little Russians in speech)	3,000,000	East and south-east
Poles	8,000,000	Poland and western provinces
Germans	2,000,000	Baltic provinces, Poland, south Russia
Swedes	300,000	Finland
Finns and Karelians	3,500,000	Finland
Esthonians	650,000	Baltic regions
Letts and Lithuanians	3,500,000	Baltic regions, Lithuania, Poland
Iranians	1,300,000	Caucasus
Rumanians	1,100,000	Bessarabia
Jews	5,000,000	Southwest, west

Tatars and other Orientals. The complexity of nationality in European Russian is indicated by the summary above.

in former Russian territory are matters that only the future can determine.

Under the Bolshevik Régime. For the events preceding the seizure of the government by the Bolsheviks see the subhead *History*, below. On November 7, 1917, control of affairs passed from Alexander Kerensky and the moderate revolutionists to the radicals, or Bolsheviks, headed by Nikolai Lenine and Leon Trotzky. The name Bolsheviks is the Russian for *belonging to the majority*, and was originally applied to the radical wing of the Socialist Democratic party, which, under the leadership of Lenine, had separated from the moderate wing in 1905. At the outbreak of the World War Lenine was living in Cracow, Austrian Poland. He had at first been interned there, but later was permitted to go to Switzerland, from which, through an arrangement made by the provisional Russian government with Germany, he was given a passport to return to Russia. He arrived in Petrograd in May, 1917, and immediately began agitating peace. Effecting a working agreement with the radicals of the social revolutionary party, composed of peasants, he soon had a large following, and by November succeeded in grasping the reins of power.

The Soviets. What may be called the Russian Soviet Republic was then established. *Soviet* means *committee*. At the time of the first revolution soviets sprang into being all over the country, in the army regiments, in the factories and in the villages. Each soviet managed the affairs of the particular group of which it was a part. When the Kerensky government fell the Bolsheviks utilized these local committees to build up a structure in which they had supreme power. All who differed from them were eliminated, and by this process Bolshevism and sovietism became one and the same thing. At the bottom of the system are the local village soviets, which elect representatives to the district soviet on a basis of one deputy to every 1,000 population. This district soviet in turn elects representatives to the province soviet on the basis of one deputy to every 10,000 population.

These province soviets in turn elect representatives to the territory or state soviet, one deputy representing 25,000 population from all these country soviets. From the great city soviets delegates are elected to the all-Russian convention on a basis of one deputy for 25,000 city electors, and one representa-

tive for every 12,500 country population. This All-Russian convention of soviets is called not less than twice a year and is the supreme authority of the republic. Participation in elections is limited to those who favor Bolshevism, and all others are barred. Thus there was established in Russia a new kind of autocracy, the dictatorship of a particular class.

This system has been defended on the plea that the vast majority of the Russian people are peasants, and that the rule of the soviets is majority rule. It has been condemned as being forced on city workers and ignorant peasants, and as excluding from political rights the minority middle and upper classes, a practice contrary to democratic principles. Defenders of Russian sovietism say that a Bolshevik dictatorship was needed to prevent the counter-revolutionists from reestablishing the monarchy, and that necessity forced the Leninists to adopt autocratic methods. As to the plea that the peasants and city workers support the Bolsheviks, the truth seems to be that they favored the Lenine program of peace and bread for the city dwellers and land and peace for the peasants. Peace "at any price" was made with Germany in February, 1918 (see *History*, below), and an attempt was made to reconstruct the entire economic system. It was popular belief in Lenine and his promises that gave him his initial power with the people.

Signing a treaty with Germany, however, did not bring peace. As has been stated, there was warfare with anti-Bolshevik groups all around the circle. Moreover, the allied blockade, which cut Russia off from outside trade, greatly complicated the internal situation. Russia could not obtain clothing, medical supplies, needed foodstuffs and the thousands of necessities that make for decent, comfortable living. Manufacturing, transportation and all those activities upon which the economic life of a nation depends became badly demoralized under the burden of civil war, the blockade and the transition from private to public ownership. The Lenine school of thought believes in communism, or the complete abolition of private ownership of all agencies of production.

A correspondent of a great American newspaper, writing in the spring of 1919, summed up the situation in these words:

"Russia's discontented millions have not thought of the consequences of reaction, and

there is no check on the blind, angry, determined dissatisfaction that is growing. Millions will welcome a change and that is as far as they have thought.

But this much can be said without hesitancy: No government except a radical government, built more or less along Socialistic lines, will ever last in Russia. The peasant is going to get the land, and all the land, for his own, and nothing is going to cheat him out of that. The city workman is going to have at least a part of the say about how his factory is run, how much he is to be paid, and his working conditions.

His factory committee is always going to be an active, radical part of the life of industry. Any future government whether it be Communist or Kolchak, must honestly represent the great masses and the great majority—which neither do at the present moment. No dictatorship of the proletariat or a dictatorship of the Communist party or a dictatorship of the reactionary aristocracy or bourgeois landlords will last for long—it will have to be a rule of the people, by the people.

The city workmen and the country peasants may not set all these things down in words, but they will never be satisfied with anything else. Primarily, they want the comforts of life, then decent liberties, and a decent share in the government and daily affairs.

Though they could not give the people home comforts, the Bolshevik leaders did secure for them cultural privileges unknown under the czarist régime. Schools for children and adults were established on the plan of organization adopted in the United States, and theaters and art galleries opened for them in Moscow and other cities. Concerts, lectures and entertainments are attended by those to whom such pleasures were once unknown.

Physical Features. Russia proper is a vast plain, which is divided into northern and southern slopes by a height of land, which passes in an irregular direction from a little north of the middle point in the Ural Mountains to the point on the Baltic where the boundaries between Russia and Germany unite. This height of land attains its greatest elevation in the Valdai Hills, directly south of Petrograd. These have an elevation of a little over 1,000 feet. On the south are the Caucasus Mountains, which have an elevation of over 18,000 feet, and to the west of these is a range of low mountains in the Crimea, which attains an altitude of about 4,000 feet. In the northern part of the eastern boundary are the Urals, reaching at the northern extremity an altitude of about 7,000 feet, though having an average height of from 4,000 to 5,000 feet.

Russia has a number of large and important rivers. To the north of the watershed and flowing into the Arctic Ocean or its coast waters are the Petchora, draining the northeastern part of the country; the Mezen; the Dvina, flowing into the Gulf of Archangel, and the Onega, flowing into the Gulf of Onega; while those flowing into the Baltic or its coast waters are the Neva, the Düna, the Niemen and the Vistula, which in the lower part of its course flows through Prussia. Of the great rivers flowing southward we find the Ural, the Great Uzen, the Volga and the Cuma, flowing into the Caspian; the Don, flowing into the Sea of Azov, and the Dnieper, the Bug and the Dniester, flowing into the Black Sea. All of these streams are navigable in the lower parts of their courses, and some of them are navigable for many miles. Russia has a number of large lakes, nearly all of which are situated in the northwestern part of the country. The largest of these, Lake Ladoga, north of Petrograd, is about the size of Lake Ontario and is the largest lake on the continent of Europe. To the northwest of this, in Finland, are other large lakes, all of which are in a low country and have marshy borders. The Caspian Sea, with its surface eighty feet below the Mediterranean and entirely enclosed by land, is really a salt lake, and the Black Sea might also be considered in the same light.

Climate. Russia extends through nearly thirty-five degrees of latitude; consequently it has a varied climate, the extreme northern part being within the Arctic regions and the southern part falling within the warm temperate regions. The absence of mountain barriers causes the country to be swept alternately by winds from the north and the south; therefore it is subject to sudden and violent changes in temperature. The western portion also has a more equable climate than the eastern, because it is much nearer the sea. The mean temperature at Petrograd for January is about 15°, and for July it is about 64°, while at Odessa, the Black Sea, it is much warmer. The average rainfall for the entire country is about twenty inches a year, but it is much greater in the northwestern than in the southeastern portions. The entire country in winter is usually covered with a heavy fall of snow and this adds much to the moisture and is of great advantage to agriculture.

Mineral Resources. Russia has an abundant supply of minerals, the most valuable being platinum, iron, copper, coal, salt, zinc, gold and silver. Coal is found in large quantities in the south-central part of the country, in the valley of the Donetz River. Iron occurs in the Ural Mountains, which are the depository of many other metals. In Caucasia are some of the most productive petroleum fields known to the world. Malachite, emeralds, diamonds and other precious stones occur in the Ural Mountains, and amber is found in the coasts of the Baltic. Building stone is not plentiful, but porcelain clay and clay suitable for brick and tile are found in a number of places. The lowlands along the Baltic contain extensive peat bogs. There are others, also, near Moscow, and these are an important source of fuel.

Agriculture. Over one-third of the area of the land is covered with forests. These occupy a belt stretching across the country immediately south of the frozen tundra in the north. The trees consist of pine, larch and other evergreens, with a few hard woods. South of this and extending across the central part of Russia and southward along the western border to the Baltic Sea is a great area of black fertile soil, embracing over 225,000,000 acres. About three-fifths of this has been put to cultivation. The chief crops are normally rye, oats, wheat, barley, potatoes and sugar beets. The great wheat belt is in the southwestern part of the country, while the more hardy cereals are raised farther north. Rye, which is the greatest food plant of the country, can be raised universally. In the southern part of the country, along the Black Sea, apples, plums, grapes, apricots and other fruits are successfully grown, and this region has become noted for its wines. Cattle, horses, sheep, goats and swine are raised throughout the country, and in the more favorable localities in the south dairying has become an important branch of agriculture.

Other Industries. In the forest region lumbering and the manufacture of potash, tar, turpentine and other forest products engage a large number of inhabitants. The fisheries of the country are also very important. Notwithstanding its numerous lakes and rivers, all of which are well stocked with fish, the country is unable to supply the local demand. The inhabitants of the extreme north are engaged to a large extent

in hunting and trapping and derive considerable revenue from the sale of furs and the feathers and down of water fowl.

Transportation. Russia has comparatively little seacoast and few important ports, but the vast plain occupying most of the country makes it possible for boats to navigate nearly all of the streams, most of which have been canalized. In addition to these, there are many miles of canals connecting the different river systems, so that it is possible for boats to pass from the White Sea to the Caspian Sea and the Black Sea and from the Caspian Sea to the Baltic Sea. European Russia has a larger canal mileage than any other country in the world, and in addition to this there are 36,000 miles of railways, which radiate from Petrograd and Moscow.

Russia formerly had an extensive commerce, carried on chiefly with Great Britain and Germany. The United States also had an important share. The exports consisted almost wholly of wheat, flour and leather, while the imports were raw material for manufactures, particularly cotton; manufactured goods, including clothing, machinery and scientific instruments, and foodstuffs. There will be excellent business opportunities for outside investors when a settled condition of international affairs permits the economic rebuilding of the country.

Literature. The oldest writings in the history of Russian literature are translations from the Old Church Slavic language of religious works, parts of the Bible and rituals for Church service. The most important of the earliest writers was Nestor, who lived early in the twelfth century, and who wrote a celebrated *Chronicle*, which is not extant. From the time of the destructive invasion of the Mongols, in the thirteenth century, until the seventeenth century, life in Russia was on a low plain intellectually, but under Peter the Great literature began to revive. Not only did the new literature show forth the national spirit, but it began to have a distinctly European character. Throughout the eighteenth century the growth continued, and to one man of that century, more than to any other person, belongs the credit for fixing the literary form of the language. This was Lomonosoff (1711-1765), whose most important works were his writings on versification and rhetoric. During the reign of Catharine II, French influence was paramount, but this was superseded about the end of the eight-

eenth century by English and German influence, and the sentimentalism then in vogue in those two countries made great headway in Russia.

Nineteenth-century Russia is represented in literature by many writers of importance, the greatest of whom are Alexander Pushkin, one of the greatest of Russian poets; Gogol, Turgenieff and Tolstoy.

History. In the ninth century Russia was inhabited by numerous tribes of Slavs, who had come, how long before is not known, from the neighborhood of the Carpathian Mountains. The total lack of union among the tribes made the Slavs an easy prey to invaders, who swept in upon them from all sides. Finally, about the middle of the ninth century, the Scandinavians, under their leader, Rurik, were invited by the Slavs to enter the country, assume rule over it and protect it from invasion. Rurik's power grew rapidly, and by 862, the date usually given as the foundation of the Russian Empire, he ruled from Novgorod a wide empire. Rurik died in 879, and Oleg, a member of his family, was made regent for Rurik's son. Under Oleg the capital of the country was removed to Kiev, and an attack was directed against Constantinople so successfully that the Byzantine emperor was obliged to pay a ransom for the city.

Gradually the descendants of Rurik strengthened and widened their kingdom, which came in time to be called Russia, probably from the name given by the Finns to the Scandinavians. Under Vladimir the Great (980-1015), the Greek form of Christianity was introduced into the country, and an effort was made to better the religious and intellectual condition of the people. By the end of the eleventh century the Russians had reached a plane of civilization little lower than that of the peoples of western Europe.

In the first half of the thirteenth century, however, the Mongols swept over Russia, and this invasion put an end to all self-government, to all intellectual progress, in fact, to all civilization. The country was cut off from western Europe, and the nationalization of the Slavs was delayed for centuries. Gradually Moscow became the strongest of the principalities of eastern Russia, and it was a grand prince of Moscow, Dmitri IV, who in 1380, by his victory over the Mongols, took the first step in the liberation of the country from the foreign yoke. As the principalities

came to recognize that, disunited, they could never hope to become free, they laid aside their dissensions and joined for the overthrow of the Tartars. Ivan the Great (1462-1505) succeeded in breaking the power of the Mongols by turning the different hordes against each other, and Ivan the Terrible (1533-1584) extended Russian rule over Kazan, Astrakhan and part of Siberia.

Following the strong rule of Ivan the Terrible came a period of anarchy and disorder, which ended with the election, in 1613, of Michael Romanoff to the throne. During the reign of Alexis, the son of Michael, considerable territory was acquired in a war with Poland, and a protectorate was assumed over the Polish Cossacks. Alexis left three sons of whom the oldest, Feodor, ruled but six years, expressing at his death the wish that his half-brother, Peter, should succeed him, rather than Ivan, the rightful heir, who was almost an imbecile. However, Peter's sister, Sophia, ambitious of power, succeeded in having Ivan proclaimed joint sovereign with Peter, intending to retain the power in her own hands. In the struggle which followed, Peter proved the stronger, Sophia was forced to retire to a convent and Peter became in reality the sole ruler of Russia, although Ivan was allowed to retain the title of czar. It is from the reign of this sovereign that the real greatness of Russia dates.

At the death of Peter (1725) the crown passed to his wife, Catharine, who was succeeded two years later by Peter's grandson, Peter II (1727-1730). The reigns of Peter, Anna Ivanovna (1730-1740) and Ivan (1740-1741) were of no great importance in the history of the country, but during the reign of Elizabeth Petrovna (1741-1762) occurred the Seven Years' War between Austria and Prussia, in which Russia took part on the side of Austria. Peter, the successor of Elizabeth, was murdered within a short time of his accession, and his wife came to the throne as Catharine II. Under Catharine Russia assumed a more prominent position among the European nations than ever before, and the genius of the queen enabled the country to support its position well. The partitions of Poland, by which Russia gained great accessions of territory, took place during Catharine's reign, and the Crimea was annexed in 1783. A war with the Turks (1787-1792), in which Russia was successful, advanced the boundaries of Russia to the Dniester.

Paul I, the son of Catharine, succeeded her on the throne and ruled from 1796 to 1801. At the outset of his reign, he seemed favorable to reform, but he speedily changed his policy and enacted repressive measures that were so galling as to be almost unendurable. Finally he was assassinated, and his son, Alexander I, came to the throne. Alexander seemed fitted both by nature and by training for his position. He was a man of high ideals and of courage enough to carry them out. Among his first acts were the freeing of the serfs in the Baltic districts, the abolishing of the system of paid espionage and the discontinuance of torture as a legal punishment.

On the death of Alexander, in 1825, his brother, Nicholas I, came to the throne. Like Alexander, Nicholas began his rule in a liberal manner, but fell back later upon a policy of repression, overcome by the difficulties which met the reformer. His foreign relations led to war with Persia, participation in the Turkish defeat at Navarino, and finally to the great struggle known as the Crimean War, before the close of which Nicholas died. His successor, Alexander II, was forced to accept the Treaty of Paris, which took from Russia a part of Bessarabia and her protectorate over the Danubian principalities. Another war with Turkey, begun in 1877, resulted much more favorably for Russia, but she was obliged by the other powers to give up a part of her gains.

At the outset of his reign, Alexander began a series of radical reforms, but before his death he had adopted the old reactionary policy and had become very unpopular. He was assassinated in 1881, and his son, Alexander III, came to the throne. One of the most lasting in its results of any of the events of the reign of Alexander III was the agitation against the Jews. Many privileges were taken from them by law, and persecutions of all sorts were begun against them. With varying severity, this persecution has continued to the present day. On the death of Alexander III, in 1894, his son came to the throne as Nicholas II. He made few changes in his father's policy, continuing especially the attempt to advance Russian interests in the East. Railways were constructed in Asiatic Russia, and trading posts were everywhere established. In 1895, at the close of the war between China and Japan, Russia came into possession of the Chinese peninsula of Liao-tung, on which

Port Arthur is situated. This port was of the utmost importance to Russia, as affording an ice-free outlet for her Siberian commodities. Constant efforts were made to make the district about Port Arthur thoroughly Russian in language and in commerce, Korea was seized on some pretext and the annexation of Mongolia was attempted. No opportunity was overlooked for sending Russian soldiers into Chinese territory, and by the close of the Boxer trouble in China, Manchuria and half of Mongolia were firmly held by Russia.

Backed by the European powers, Japan protested against the aggressions of Russia and brought such pressure to bear that the evacuation of the territory by October, 1903, was promised by Russia. Later it became evident that the czar was still hoping to annex the territory which he held, and Japan, fearing for Korea, of which she considered herself the natural guardian, saw that she would be obliged to drive Russia from Chinese territory. On February 6, 1904, the Japanese representative left Petrograd, and two days later active hostilities began. For the military events of the war, see RUSSO-JAPANESE WAR.

The complete defeat of Russia in this struggle had some beneficial effects on the country. It aroused the people to a sense of the inefficiency of their government and showed them the corruption which existed in the official life of the country. This awakening had begun, however, long before the close of the struggle. Throughout the war Nicholas II had showed himself utterly unable, by reason of his vacillating disposition, to deal with the grave situation which confronted him. The reactionary class, which was completely in control, prevented the spread of education among the poorer classes, reduced the peasants to the condition of mere slaves; forced them to give most of their earnings in taxes to support the favored classes—in short, brought the country to a condition little different from that of France previous to the Revolution. The damage done to Russian trade by the war with Japan threw hundreds of thousands of laborers out of work, race wars broke out among the different peoples within the country, and everywhere demands for freedom were made.

The czar seemed at first ready to grant concessions, but the reactionary party was

too strong, and the petitions for representative government were refused. The spirit of revolt spread; peasant risings occurred; the national troops, in their attempts to quell the disturbances, were resisted by armed forces, and the crew of the warship *Potemkin* mutinied and cruised from one Black Sea Port to another. At length the czar found himself compelled to grant certain reforms and, most important of all, to promise the assembling of a representative legislative body. Mere promises of reform, however, were looked upon with suspicion by the revolutionist party, which was to be satisfied with nothing less radical than the proclamation of a democratic republic, and violent outbreaks constantly occurred in different parts of the country.

The promised legislative body, the Duma, held its first session on May 10, 1906. After ten weeks of free discussion of conditions in Russia, during which important demands were made upon the czar, amounting in substance to the relinquishment of his autocratic power and the granting of real administrative control to the people, the czar dissolved the Duma, July 21. A second Duma, elected on a greatly restricted franchise, assembled March 1, 1907, and was dissolved by the edict of the czar on June 17. The third Duma met in November, but soon adjourned to meet on June 21, 1908. This Duma was chosen as the result of the arbitrary action of the government, and did not fully represent the people. It favored the government and continued to sit until 1912. The sessions of the fourth Duma began in November, 1912. The freedom of action of the Duma, though in theory almost unlimited, was greatly lessened by the influence of the bureaucracy.

The World War. In July, 1914, affairs were approaching a crisis in Russia, and the time seemed ripe for a new revolution. Then came the Austrian attack on Serbia and Russia's defense of the small Slavic nation, the outcome of which was the opening of the European war (for details of this critical period, see *WORLD WAR*). The imminence of war overshadowed the domestic situation, and it was seemingly a united Russia that entered the struggle. An offensive in Austrian Poland (Galicia) was a brilliant success, but in the summer of 1915 the Russian troops were badly defeated by the Austro-Germans, who drove them out of Galicia, recaptured Lem-

berg and Przemyśl, forced the capitulation of Warsaw and threatened Vilna and Riga. The Russian people were roused to intense indignation by these disasters, which were the result of inefficiency and even treachery in the government. Russia was betrayed by its own officials, some of whom had been carrying on an intrigue with Germany from the beginning of the struggle. In this treasonable business the czarina herself had a hand, but the czar was probably blameless. Munitions were deliberately withheld from the troops, and there was general disorganization of all military departments.

In spite of the efforts of the traitors, a powerful organization for carrying on the war efficiently was functioning. This was the All-Russian Zemstvos Union, representing a league of all the zemstvos in the country. Under the old system Russia proper was divided into governments for local administration. Each government was divided into districts, and in the regions inhabited by the Great Russians and Little Russians each district had an elected assembly called the zemstvo. The duties of the zemstvos included the administration of charity, public health, education, etc., the construction of public works and the supervision of other matters concerning the district. These assemblies by uniting for war work accomplished miracles for the disorganized country. Up to October, 1916, the Zemstvos Union, in coöperation with other societies, had established over 3,000 military hospitals and had distributed vast quantities of supplies among the troops. The work of these societies showed the possibilities of the nation could it be freed from the paralyzing rule of the old bureaucracy. Another vital factor in the progress of democracy was the ukase of the czar prohibiting the sale and use of vodka, the national beverage. The elimination of drinking and drunkenness had much to do with ridding the people of their inertia.

Though Russia's withdrawal from the war in 1917-1918 prolonged the struggle, the country saved the day for the allies by keeping Germany and Austria occupied in the east while Britain was creating its great army. Russia had lost nearly 5,000,000 men by the end of 1916, and was then approaching exhaustion. The Pro-German elements in the government, who had helped bring about this exhaustion, were working for a separate peace with Germany early in 1917, and only

the outbreak of the revolution forestalled this allied disaster.

The Revolution of 1917. Throughout February and March strikes, food riots and mob demonstrations prevailed in Petrograd and Moscow, and on March 11 the government ordered the dissolution of the Duma. Instead of dissolving, the Duma, in the person of its president, telegraphed a defiance to the czar, and the troops began seizing the Cabinet ministers. Among those arrested was former Prime Minister Stürmer, who had been openly accused in the Duma of being a traitor. Shortly after, the Duma voted a resolution authorizing the executive council of the assembly to establish a provisional government, and on March 15 the czar was required to sign a manifesto declaring his abdication and that of the heir apparent, Alexis. On the same day a coalition Cabinet was formed, at the head of which was Prince Lvoff, organizer of the Zemstvos Union, and the representative of the business men and landowners. Professor Paul Milyukof, Minister of Foreign Affairs, represented the Constitutional Democrats (also called cadets), and Alexander Kerensky, Minister of Justice, represented the most powerful group, the workingmen and soldiers. Kerensky was a Socialist, but without radical tendencies.

The new government endeavored to carry out a program of reform, but it was soon evident that the Cabinet was not radical enough to satisfy the masses. In May the pacifist elements forced the resignation of Milyukov, who was suspected of imperialistic tendencies. To Kerensky, who was then moved up to the position of War Minister, fell the task of organizing an offensive among soldiers who had lost all heart for fighting. The army was daily becoming more disorganized. The Workmen's and Soldiers' Council in Petrograd was demanding that the allies state their war aims, and urging a program of no indemnities and no annexations. Lenine, who had returned to Petrograd in May, began a vigorous peace propaganda that later had its effect. In June the Duma was abolished by the Workmen's and Soldiers' delegates, who were becoming increasingly powerful.

In the midst of this confusion Kerensky was steadily coming forward as the most satisfactory representative of the people, and in July he became Prime Minister. A threatened revolt by Lenine and his followers was put down, but this favorable move

was offset by news of military disaster in Galicia, where the Russian troops had begun a promising offensive. The campaign was ill advised and should not have been undertaken, for discipline had relaxed, the troops had lost their morale and the number of desertions was appalling. It was soon evident that Russia was no longer an asset to the allies, and the allied governments then hoped only for passive resistance. The Lenine propaganda, however, became too strong for Kerensky to overcome. On November 7 the Bolsheviks seized Petrograd, and on November 9 the All-Russian Congress of Workmen's and Soldiers' delegates named a Cabinet with Lenine as Premier and Trotsky as Minister for Foreign Affairs. Kerensky, supported heroically but futilely by the cadet soldiers and the women's "Legion of Death," fled, the peasant army went over to the new government, and Russia entered upon a new phase of its revolution.

Later Developments. The system under which the government functioned thereafter has already been described. On his accession to power Lenine began to put his Bolshevik program into effect. In regard to domestic matters, decrees were issued placing all factories in the possession of workmen, abolishing private ownership of land, and giving to the state possession of mines, forests and waterways. As a part of his foreign policy, Lenine proposed to all the belligerents that they declare a general armistice, and he published certain secret documents stored in the Russian archives. These were treaties made between Russia and its allies, and their publication was for the purpose of persuading the people that the allies were as imperialistic as Germany. No reply having been received to his proposals to the allied belligerents, Lenine declared the Russians were justified in making peace with Germany, and on December 14 an armistice was signed at the ruined city of Brest-Litovsk, the German headquarters in the east. After several weeks of negotiation, a treaty was concluded at this place, by which Russia signed away the right to one-thirtieth of its territory and one-fifth of its population. All sovereignty over Esthonia, Livonia, Courland, Poland, Finland and the Ukraine was relinquished, representing 298,650 square miles, and Russia promised to demobilize its army and to release German prisoners. It was Germany's inten-

tion of making the relinquished provinces German principalities, and only its own defeat, a year later, defeated this plan. The Treaty of Brest-Litovsk, which was a terrible blow to the allies, was ratified by a congress of soviets at Moscow, in March, 1918.

Opposition to the Bolshevik régime developed in many sections, and Trotzky, who was made Minister of War, began the training of an immense revolutionary army. There was continuous military activity for a long period, but eventually all of old Russia, except Finland, Poland and a few small provinces on the Baltic came under the control of the Soviet government at Moscow. Russia failed to secure recognition by the Peace Conference and not until 1924 did any of the great powers give full recognition, and these only for commercial advantage. The government under Lenine was forced to give up a part of its communistic practices, and to admit capitalism under certain conditions. The currency was so greatly inflated that it practically lost all value by 1923, and measures were taken to restore its stability.

Lenine died in January, 1924, after a long illness, and his funeral in Moscow was the occasion of a great demonstration by the Russian people, many of whom considered him an inspired prophet. A new ministry was organized, with Alexis Ivanovitch Rykoff as Head of the Council of Commissars, George Tchitcherin, Minister of Foreign Affairs, and Leon Trotzky, Minister of War.

Related Articles. Consult the following titles for additional information:

CITIES

Archangel	Moscow
Astrakhan	Nizhni Novgorod
Baku	Odessa
Ekaterina	Petrograd
Kazan	Reval
Kharkov	Riga
Kiev	Sebastopol
Kishinev	Tiflis
Kronstadt	Vilna
Minsk	Vladivostok

GEOGRAPHICAL DIVISIONS

Bessarabia	Esthonia	Lithuania
Bokhara	Finland	Poland
Circassia	Georgia	Siberia
Courland	Livonia	Turkestan
Crimea	Ural	Ukraine

LAKES

Ladoga	Onega
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RIVERS

Dnieper	Don	Vistula
Dniester	Neva	Volga

HISTORY

Alexander, I, II, III	Lenine, Nikolai
Berlin, Congress of	Nicholas, I, II
Bolsheviks	Nihilists
Catharine I, II	Paul I
Cossacks	Peter I
Crimean War	Russo-Turkish Wars
Holy Alliance	Trotzky, Leon
Ivan, III, IV	World War

RUS'SO-JAPANESE' WAR, a war between Russia and Japan, beginning in February, 1904, and continuing until September, 1905. The chief cause of the conflict was Russia's attempt to gain control of Manchuria and Korea, and thus make its position in the Far East so strong that it could dominate Japan. At the close of the war between China and Japan in 1895, Japan had won control of Formosa and Liao-tung Peninsula, including Port Arthur. The leading European nations, however, forced Japan to cede Liao-tung back to China, and Russia immediately leased this peninsula. Russia had already gained control of Sakhalin Island, had completed the Trans-Siberian Railway and established ports at Vladivostok and Port Arthur, notwithstanding the repeated protests of Japan, which saw its very existence threatened by these movements.

Resources of the Combatants. Russia was far superior to Japan in numbers and material, but Japan had the better trained army. Moreover, while Russia had about 80,000 troops at the seat of war, Japan had over 200,000 at hand, while it required weeks and months for Russia to ship men and supplies from Petrograd (Saint Petersburg) to the front, Japan could render its armies in the field all possible assistance in a few hours' notice. It was Russia's policy, therefore, to delay engagements until reinforcements from Europe should arrive. On the other hand, it was Japan's policy to strike at once.

Siege of Port Arthur. From the first, the capture of Port Arthur was the chief objective of the Japanese. The first attack was made by Vice Admiral Togo, on February 8, 1904. The Russian fleet suffered great damage, and the Russian forces withdrew to the land forts. Port Arthur was blockaded, and the Russian general Kuropatkin was dislodged from his position and retreated towards Mukden. At the close of a five-days' battle in October, the Russians again retreated. After a number of attempts to capture Port Arthur by storm, the Japanese through trench warfare compelled the city to surrender January 2, 1905.

Other Engagements. There were no important engagements about Mukden until February 20, 1905, when the Japanese advance began. The series of engagements known as the Battle of Mukden constituted the greatest land battle of history previous to the World War. Over 700,000 men were

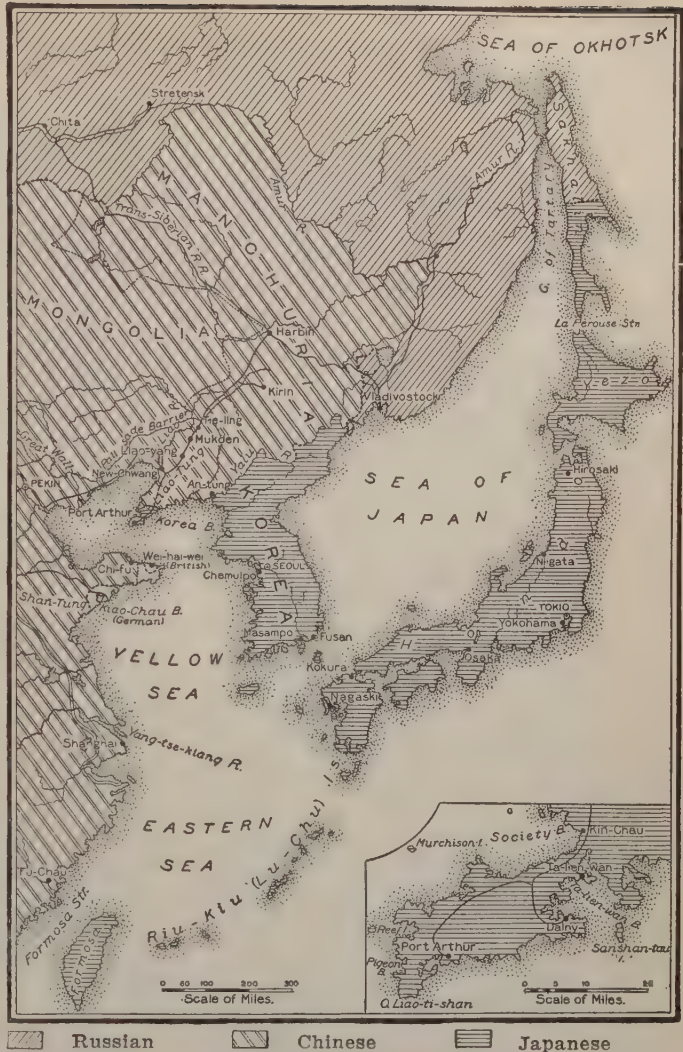
engaged, and the line of battle extended over eighty miles. The Japanese were reinforced by troops from Port Arthur under General Nogi, and were finally victorious. The naval battle in the Sea of Japan, May 27 and 28, resulted in the destruction of the Russian fleet.

Treaty of Peace. In June, 1905, President Roosevelt, voicing the sentiment of almost all nations, suggested to the combatants the advisability of ending the struggle, and in August of that year the peace convention met at Portsmouth, New Hampshire. The treaty, which was signed on September 5, gave Port Arthur to Japan, made it supreme in Korea, allowed it important railway privileges in Manchuria and ceded to it the southern half of Sakhalin Island. One of the most important results of the war for Japan was the raising of that nation to a first-class power.

RUS'SO-TURKISH WAR, the war between Russia and Turkey in 1877 and 1878. For some years Russia had been looking for an opportunity to retake the territory lost in the Crimean War, and the massacre of Christians in Bulgaria in 1876 offered a pretext for again making war on Turkey. Russia declared itself the defender of the Christians in the Balkan provinces, and began the war in 1877. The rout of the Turks at Philippopolis and the capture of Plevna were the only important engagements. Russia resorted to modern methods of warfare, and in a few months wore the Turks out. The war was ended by the treaty of San Stefano, which was very favorable to Russia. However, the other great powers, England, France and Germany, felt that the treaty gave Russia more

power than could safely be given that country, and the Congress of Berlin was called to modify the terms of the treaty. See **BERLIN, CONGRESS OF.**

RUST, the brownish-red substance that forms on the surface of iron and steel when they are exposed to damp air, or to the action of air and water. When the name is used without any explanation it means *iron rust*. It is an oxide of iron. Rust may be removed from iron or steel by polishing with emery or some other powder. If a deep coat is formed, however, a file, a grindstone or an



THE RUSSO-JAPANESE WAR
Showing battles and rearrangement of boundaries.

emery wheel may be necessary. Yellow spots formed on linen by iron rust may be removed by soaking the fabric in a weak solution of oxalic acid and then washing it, though a strong solution of this acid is likely to weaken or destroy the fabric. Sometimes lemon juice will remove the spots.

RUSTS, minute fungi that attack the leaves and stems of certain plants and cause extensive damage to wheat and some other crops. These fungi take their name from the resemblance of the disease they produce to iron rust.

Rust may be said to begin with little black dots and lines that appear on the surface of the stem late in summer. These lines are the innumerable spores which constitute the form in which the plant survives the winter, or its rest period. In spring each spore begins to grow, but after a little, it will die, unless in some way it is carried to the barberry bush. Upon the leaves of that shrub the growing spores thrive lustily, and soon they grow to be long chains of little fringed cups, on the lower side of the leaves. These cups produce a different kind of spores, which are carried by the wind, or in some other way, to wheat or grass or some cereal, where they force their way into the pores of the leaves and mature the blight spores that spoil the fruit. A field infected with rust should not be planted to the same crop the second season. After the harvest the stubble and straw should be burned and the ground thoroughly plowed. A tillage crop, such as corn or potatoes, assures the destruction of the spores.

RUTH, BOOK OF, a book of the Old Testament, between *Judges* and *Samuel*. It gives a beautiful picture of the domestic life and customs of the Israelites of that period. Ruth, the heroine, who gives the name to the book, by her marriage with Boaz, a wealthy landowner of Bethlehem, became the grandmother of David, and one of the ancestors of Jesus. The name of the writer and time of writing are unknown. For the detailed story of Ruth, see *BIBLE*, subhead *Bible Stories*.

RUTHENIANS, or **LITTLE RUS'SIANS**, the name applied to the Slavs inhabiting Southern Russia and Austria on both sides of the Carpathian Mountains. They number about 20,000,000, about one-fourth of whom are in Galicia. They are short of stature, and have brown hair and eyes. They speak the Russian language, and most of them belong to the United Greek Church. Agriculture is

about their only occupation, and they employ methods and implements long since discarded by more progressive peoples. For the position of the Ruthenians at the close of the World War, see *GALICIA*.

RUTILE, *roo'til*, a brownish-red mineral that forms hairlike crystals in transparent quartz. It also occurs in brown masses. Rutile is found in the largest quantities in Sweden, in the Ural Mountains, and in the United States. It is used for coloring glass and porcelain a yellow tint. Transparent quartz containing rutile forms attractive cabinet specimens. Some of the finest specimens are polished and set, making beautiful gems.

RUTLAND, VT., the county seat of Rutland County, fifty-six miles southeast of Montpelier, on the Otter Creek and on the Rutland, the Clarendon & Pittsford and the Delaware & Hudson railroads. The city is situated near lofty and picturesque peaks of the Green Mountains and in a region containing very extensive deposits of marble. Iron ore, fire clay and slate are also found, and the city has the largest scale works in the world, railroad shops, lumber mills, machine shops, boiler and engine works and other factories. The prominent buildings include Memorial Hall, a courthouse, a Federal building, public and Baxter libraries, the house of correction, a Knights of Pythias Home and a hospital. The place was settled about 1770. From 1784 to 1804 Rutland was one of the state capitals, and the state house, constructed in 1784, is the second oldest building in the state. During the Revolution two forts were erected here. The city was chartered in 1892. Population, 1910, 13,546; in 1920, 14,954, a gain of 10 per cent.

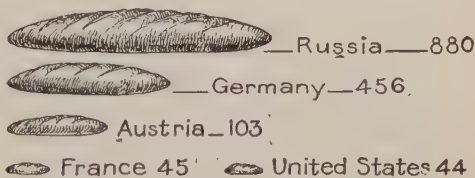
RUTLEDGE, *rut'lej*, JOHN (1739-1800), an American statesman and jurist of Revolutionary days, first governor of the state of South Carolina. He labored earnestly for the independence of the colonies, both in his native state and in Congress. He represented South Carolina in the Stamp Act Congress, and in the Constitutional Convention was a warm supporter of the Federal Constitution. Rutledge was appointed one of the first justices of the United States Supreme Court, but later resigned this position to become chief justice of the supreme court of South Carolina. In 1795 Washington appointed him Chief Justice of the United States Supreme Court, but Rutledge's mind giving way, the appointment was not confirmed.

RUYSDAEL, or **RUISDAEL**, *roys'dahl*, JACOB VAN (1625–1682), the foremost of Dutch landscape painters. He was born at Haarlem, and spent much of his life at Amsterdam, where, between 1660 and 1675, his best work was done. During his lifetime his work was not highly valued, and he died in an almshouse. Although he painted views of the sea and coasts, most of his subjects were quiet waysides and lovely forest glades. Unlike most landscape painters, his object was not to reproduce particular scenes, but to produce a beautiful composition made up of various elements gathered promiscuously; thus his canvases are a sort of idealization of nature. Among the fine examples of his work are *Landscape with Ruins* (National Gallery, London); *Storm at Sea* (Louvre); *Cottage Under Trees*, *Wheatfields and Forest Stream* (Metropolitan Museum, New York).

RY'AN, ABRAM JOSEPH (1839–1886), an American Roman Catholic priest and poet. Soon after his ordination Father Ryan became a chaplain in the Confederate army and served until the war closed. Afterwards he edited *The Star* and *The Banner of the South*, both Roman Catholic weeklies. Subsequently he was in charge of a parish in Mobile, Ala., where he remained until 1880. His best known poems are *The Conquered Banner*, written at the close of the Civil War, *The Lost Cause*, and *The Flag of Erin*.

RYE, a grain closely related to wheat and barley. It originated in Siberia, and is raised farther north than any other grain. For centuries rye has been one of the most important food plants. It has been cultivated in Asia and Europe since time immemorial. It thrives in climates and in soils which forbid wheat, requires less manure and ripens faster. It is extensively grown in northern Europe, and rye bread forms an important article of food for the laboring classes of many parts of Russia, Sweden, Norway, Denmark, Holland, and Prussia. Unmalted rye meal, mixed with barley malt and fermented, forms the mash whence is distilled the spirit known as Holland gin

(See GIN). The straw is long and flexible, does not rot easily and is used by brick-makers and thatchers, also for stuffing horse collars and mattresses and for making baskets, straw hats, and bonnets. A fungus



Figures Represent Millions of Bushels

PRINCIPAL PRODUCING NATIONS
sometimes grows on rye, causing the disease known as ergot, which makes rye so infected dangerous for food. See ERGOT.

A good crop of rye yields from twenty to thirty bushels of grain per acre. Before its revolution, Russia was the greatest rye-producing country in the world. The average annual production of this grain in the United States is about 70,000,000 bushels, with a yield approximately of sixteen bushels per acre.

RYE HOUSE PLOT, a conspiracy planned by some of the most radical of the English Whigs in 1683 to assassinate Charles II, on his return from the races at Newmarket. The plot was to have been executed at Rye House, a farm on the road to London, and from this fact the plot derived its name. Charles left Newmarket several days before he was expected to, and the plot failed. The conspiracy was afterwards detected, and Lord William Russell and Algernon Sidney were beheaded, though their connection with the plot was not proven. The Earl of Essex, another of the conspirators, committed suicide in the Tower of London.

RYSWICK, *riz'wik*, **TREATY OF**, a treaty negotiated between France and Great Britain on one side and Spain and Holland on the other, Sept. 20, 1697. This treaty ended the nine years' war between Louis XIV and the Grand Alliance and restored to the respective countries all conquests made in America and the East Indies during the war. The village of Ryswick is near The Hague.



S, the nineteenth letter of the English alphabet. The corresponding letter of the Phoenician alphabet had somewhat the form of a *w*, which in Greek was turned on edge, gradually becoming rounded into its present form. *S* has a twofold pronunciation—the sharp, or sibilant, character, as in *sack*, *sin*, *this*, *thus*; and the soft or sonant, *z* sound, as in *muse*, *flies*. In certain words, as *fissure*, *sugar*, *passion*, it has the sound of *sh*.

SABBATH, *sab'ath*, the Hebrews' divinely appointed day of rest and worship. The origin of the Sabbath is given in the Bible in the second chapter of Genesis:

"And on the seventh day God ended his work which He had made; and He rested on the seventh day from all His work which He had made. And God blessed the seventh day and sanctified it."

In the Ten Commandments the Israelites are expressly commanded to observe the Sabbath, in the words: "Thou shalt observe the Sabbath day to keep it holy." For centuries this commandment was obeyed to the letter. No work was allowed, and one could not travel farther than a Sabbath-day's journey, a little less than a mile, from the city. The Pharisees added many trivial rites and ceremonies to Sabbath observance, and at the coming of Christ they placed greater emphasis on the letter than the spirit of the law. Christ taught that it was lawful to do good on the Sabbath, and that the Sabbath was made for man, and not man for the Sabbath.

As every seventh day among the Jews was a day of rest for man, so every seventh year was a year of rest for the land, and was known as the *Sabbatical year* of release for Jewish debtors.

Sunday. Saturday is the Sabbath of the Jews and a few minor Christian sects, but the Christian Church in general observes Sunday, or the first day of the week, as a

day sacred to rest and worship. There is no reference to the Sabbath in the New Testament, except in the Gospels, but there are numerous references to the first day of the week. Since this was the day on which Christ rose from the dead the Christians adopted it as their Sabbath, and its observance as a day of rest and worship, or as the Lord's Day, has become general.

SABINE, *sa been'*, a river rising in the northeastern part of Texas and flowing south-eastward, then southward to the Gulf of Mexico through Sabine Lake and Sabine Pass. It is about 500 miles in length, and for about 300 miles forms the boundary between Texas and Louisiana. It is navigable only by small steamers.

SABINES, *sa beenz'*, an ancient Italian people, allied to the Latins, and an important nation before the foundation of Rome. They were a brave, religious race, confined to the mountain districts to the northeast of Rome. According to legend, the daughters of the Sabines were seized and carried off by the early Roman youths for wives while they were being feted at a great festival. When the Sabines were dissuaded by the Romans from waging war upon them, the two nations united in 290 B. C., the Sabines settling on Quirinal Hill. See **ROME**, **HISTORY OF**.

SABLE, a small fur-bearing animal, a native of Siberia. It is akin to the American sable and the pine marten. It averages a foot and a half in length, and has a bushy tail and glossy brown fur. The animal makes its home in rock crevices and in trees, and is very wary and difficult to capture. Nuts and such small animals as squirrels, birds and mice constitute its food. Sable fur is one of the most valuable of all commercial furs, a single small pelt sometimes bringing \$200. A coat made of sable of fine quality is worth several thousand dollars.

SABLE ISLAND, the "graveyard of the Atlantic," known to early navigators as Santa Cruz, or "Holy Cross," is a low, crescent-shaped sandy island, twenty miles long, south-east of Nova Scotia, to which it belongs. The Canadian government has planted thousands



SABLE

of trees here to stabilize its shifting sands. As the island is surrounded by shoals and sandbanks, constant vigilance is maintained by its lighthouse, life-saving, and wireless telegraph stations. Navigation is dangerous in the vicinity owing to storms, icebergs and a generally rough sea.

SABOTAGE, *sab o tahzh'*, a French term derived from *sabot*, meaning a *wooden shoe*, or *to cut shoes*. Since 1887 the meaning has been extended by certain labor organizations to apply to damaging or destroying the property of an employer by workmen, who take this means instead of strikes for securing their demands. Sabotage takes various forms. Among the most common are damaging machinery by putting sand in the bearings; cutting logs shorter than the required length and sawing boards thinner than the required dimensions; mislaying tools, and thus causing delay; using poorly prepared material in building; working so slowly and accomplishing so little that the employer suffers loss—in short, doing anything in secret that will annoy the employer and reduce his profits. In nearly all cases it is very difficult to detect the malefactors.

Sabotage is repudiated by all reputable labor organizations, but it is upheld by the Syndicalists in Europe and by the Industrial Workers of the World in America. See **SYNDICALISM**; **INDUSTRIAL WORKERS OF THE WORLD**.

SAC, or **SAUK**, a tribe of the Algonquian family of Indians, whom the French explorers found in Northern Wisconsin in the latter part of the seventeenth century. They, with their kindred, the Foxes, were gradually driven south by the Ojibwa, and the two tribes formed a confederation. Both the Sacs and Foxes were noted for their hostility to the whites. Black Hawk, one of their chiefs, was one of the most famous Indians in history. Both tribes were driven westward and nearly exterminated, though a few still live in Kansas and Oklahoma. See **BLACK HAWK**.

SACCHARIN, *sak'a rin*, a white powder five hundred times sweeter than cane sugar. It was made known to the world in 1879 by Dr. Constantin Fahlberg of Germany and Prof. Ira Remsen, a noted American chemist. Although the sweetening power of saccharin is much greater than that of sugar, it does not contain as much nourishment. It is not fermentable and is used in the treatment of certain diseases, such as diabetes, and in many cases in which the palate craves for sweets, but in which ordinary sugar cannot, without danger, be permitted. Saccharin is extensively used in the manufacture of confectionery and cordials, in baking and in preserving fruit. It is usually sold in tablets.

SACHS, *zahks*, **HANS** (1494-1576), Germany's most distinguished sixteenth-century meistersinger and poet, born at Nuremberg. He learned the trade of a shoemaker, and after four years' wandering throughout Germany as journeyman to his trade, he returned to his native city, where he remained until his death. He was most prolific, having written almost 7,000 meistersongs, dramas, narratives, fables, and hymns, one-fourth of which are in print. Sachs succeeded in imparting to his hymns a spiritual feeling which considerably aided the spread of the Reformation.

SACRAMENT, *sak'ra ment*, in the Christian Church, the observance of a solemn rite for the purpose of bringing the worshiper into closer communion with God. The sacraments universally observed by the Christian Church are baptism and the Lord's Supper. To these the Roman Catholic and Greek churches add confirmation, the eucharist, penance, extreme unction, holy orders and matrimony. Quakers reject all sacrifices as unnecessary formalities. Most

Protestant Churches claim that sacraments are a solemn covenant between God and the soul, but that in themselves they are not means of grace.

SACRAMENTO, *sak ra men'toh*, CALIF., the capital of the state and the county seat of Sacramento County, is situated on the Sacramento and American rivers, ninety miles northeast of San Francisco. It is served by the Southern Pacific and the Western Pacific railways, and by an extensive system of electric interurban lines. The city occupies a low plain bordering on the river, and is surrounded by a fertile and beautiful country. The streets are broad and lined with shade trees.

The state capitol, completed in 1869 at an expense of \$2,500,000, is the most prominent structure in the city. It stands in the center of a park of thirty-four acres, beautifully laid out in walks, lawns and flower beds, interspersed by many rare and beautiful trees. Additional buildings to cost \$3,000,000 are to be erected for state use. Other public buildings of note include a Federal building, a city hall, a courthouse, the Crocker Art Gallery, a Y. M. C. A. building, the Trust Exchange, the Foresters', Masonic, Elks' and Odd Fellows' buildings, the Forum, the Sutter and Women's Clubs and the Sacramento and Travelers' hotels.

Sacramento has several parks, whose combined area exceeds 1,000 acres. These include Capitol Park, McKinley Park, South Side, Del Paso and a number of smaller areas. The grounds of the State Agricultural Society adjoin the city, and the annual state fair is held there. Among the educational institutions are the State Library, one of the largest on the Pacific coast, the Public Library, the Odd Fellows' Library, the Christian Brothers' College, Howe's Academy and Saint Joseph's Academy. The leading benevolent institutions are the Marguerite Home, the Protestant Orphan Asylum, the County Hospital and the hospital of the Southern Pacific Railway.

Sacramento is in one of the most fertile agricultural regions of the state, and it is the distributing point for large quantities of fruits and agricultural produce. Some of the largest industrial plants are connected with the handling of fruit. The manufactories include flour and grist mills, canneries, foundries and machine shops,

meat-packing establishments, and manufactories of carriages, harness and saddles, furniture, soap and other commodities. The repair shops of the Western Pacific and the Southern Pacific railways are located here, the latter employing about 3,500 men.

The first settlement was made by Captain John A. Sutter in 1839. Two years later Captain Sutter built a fort and named the place New Helvetia. In 1848 the name was changed to Sacramento and the first lots for the town were sold. During the early fifties Sacramento was an important distributing point for the gold mines in the surrounding country and was connected by stage with Stockton, Maryville and several other places. It became the capital in 1854, and two years later the first railroad reached the city. During its early days the city suffered several times from floods, but later the low land was raised and the city was protected by dikes. Several disastrous fires have also occurred. However, the city has recovered from each of these disasters and has continued to grow and to increase in commercial importance. Population, 1910, 44,696; in 1920, 65,857.

SACRAMENTO RIVER, the largest river in California, has its source on the western slope of Mount Shasta and flows south into Suisun Bay. It is 600 miles long, and is navigable for 300 miles for small boats, and to Sacramento, the only large town on its banks, for larger vessels. Its chief tributaries are the Pitt and the San Joaquin. The Pitt is sometimes called the Upper Sacramento. The Sacramento flows through a fertile region and waters a beautiful and fruitful valley.

SACRED COLLEGE, or COLLEGE OF CARDINALS, the entire body of cardinals in the Roman Catholic Church. The cardinals are appointed by the Pope, and they assist him in managing the affairs of the Church. At present there are seventy, but the number has varied from time to time. The Sacred College is a corporate body, with an income of its own. Its most solemn duty is, upon the death of the Pope, to elect his successor. During the election the members are excluded from intercourse with the public. See CARDINAL; POPE; ROMAN CATHOLIC CHURCH.

SACRIFICES, *sak'ri fi ses*, gifts offered to a god in thanksgiving, for the purpose of communion or to secure atonement for sin. The idea underlying sacrifices is that worship

should consist in something more than words, the giving of something dear to the worshiper. Among the ancients sacrifices were often offered to counteract the wicked disposition of a god or to turn aside his wrath.

The sacrifices offered by the Jews are the most noteworthy. They were of two types—the bloody, and those without blood—that is, animal sacrifices and sacrifices of the fruits of the land. The animal offerings included the *burnt offering*, a lamb, male, without blemish, offered twice daily for the people, in the name of the nation; the *peace offering*, a lamb or goat, male or female, without blemish, offered by families at new moons, or on special occasions of thanksgiving; and the *guilt offering* made by individuals for cleansing from sin, and, once a year by the High Priest, on Atonement Day, for the sins of the nation. Details of the sacrifices are found in the book of *Leviticus*. Few religions, whether ancient or modern, have omitted sacrifices from among their rites. The ancestors of all the existing races in Europe practiced human sacrifices, and similar usages widely prevailed throughout the world.

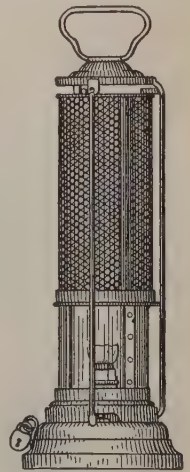
SADDLE, a seat placed on a horse's back for the rider. In early ages, the rider sat on the bare back of his horse, but in course of time some kind of covering was placed over the back of the animal. Such coverings became afterward more costly and were sometimes richly decorated. The modern riding saddle consists of the tree, generally of beech, the seat, the skirts and the flaps, of tanned pig's skin. The construction and weight vary according to the purposes for which it is to be used. Among the varieties are racing saddles, military saddles, hunting saddles, and side-saddles, for ladies.

SADDUCEES, *sad'u seez*, one of the two chief sects or parties among the Jews at the time of Christ. The sect had its origin among the aristocracy, and most of the high offices were held by its members. The high priests Annas and Caiphas were Sadducees. Josephus, the Jewish historian, said of them: "They had only the rich on their side, but not the common people." A constant feud existed between the Pharisees and Sadducees. The latter adhered to the Law of Moses, but rejected the oral law; they denied the resurrection of the dead, and did not believe in angels and spirits. After the destruction of Jerusalem by Titus, the Sadducees disappeared. See PHARISEES.

SADOWA, *sah'doh vah*, BATTLE OF (also known as the Battle of Königgrätz), a battle fought July 3, 1866, between the Austrians and the Prussians in the village of Sadowa, in Bohemia, the Austrians suffering defeat. It was the decisive engagement of the Seven Weeks' War, and as a result Prussia became the leading state of the North German Confederation and ultimately of the German Empire. See SEVEN WEEKS' WAR.

SAFE, a steel box, used to protect valuables from fire and burglars. Safes have double walls of steel, with a space between, usually six or eight inches wide, filled with some substance which does not readily conduct heat. Most compositions used for this purpose contain clay, gypsum and alum, or some similar substance. Sometimes the space contains bottles filled with water. In case of fire the water forms steam, which protects the inner wall from heat. The outside casing of a safe is made of very hard steel, and the plates and doors are fitted with the greatest care, so as not to admit even of the finest pointed tool to the joints. The door is fastened by a combination lock, which is manipulated by the turning of a handle. When the door is locked and the combination is manipulated, the door cannot be opened until the necessary number of turns have been given to the indicator. Safes used in banks usually have the time for opening regulated by a clock, and are considered more nearly proof against burglars than safes without this device. The modern vault is a large safe built up of alternate layers of steel plates.

SAFETY LAMP, a lamp for lighting coal mines without exposing the miners to the explosion of a gas called *fire damp*. The first safety lamp was invented by Sir Humphry Davy in 1816, and until quite recently his pattern, with some slight modifications, was in general use. It consists of an ordinary oil lamp, surrounded by a



SAFETY LAMP cylinder of wire gauze of fine mesh, which is locked over the lamp after it is lighted. The heat of the flame will not pass through this

gauze screen and ignite the gas outside until the gauze has become as hot as the flame, and it will not become so heated before the miner has time to withdraw from the chamber. The presence of fire damp can be detected by lowering the wick, when a pale blue flame will be noticed above the flame of the lamp if the gas is present. A prudent miner, observing this warning, will immediately withdraw from the locality. There are several patterns of safety lamps in use, but they all depend upon the principle of Davy's lamp. See FIRE DAMP.

SAFETY VALVE, an appliance attached to steam boilers to regulate the pressure of steam. The safety valve consists of a steel or iron stopper that fits an opening in the boiler somewhat as a cork fits the mouth of a bottle. The valve is held tightly in place by weights attached to a lever or by a spring. In either case the valve is gauged to open at a pressure several pounds below what the boiler is estimated to carry with safety. When the steam reaches the pressure at which the valve is gauged, it opens and some of the steam escapes; the pressure therefore cannot increase above this point. Boilers of locomotives and steamships carry safety valves regulated by a spring, but those on most stationary boilers are gauged by weights. Weights are preferred by engineers because their pressure is constant, while the pressure of springs may vary. See BOILER.

SAFFLOWER, *saf'lou er*, a large, thistle-like plant, with orange-red flowers, cultivated in China, India, Egypt and Southern Europe. Its modern use as a dyestuff has largely been replaced by aniline dyes, and it is now most generally employed in the preparation of rouge and to adulterate saffron. In India an oil for fuel and cooking purposes is pressed from the seeds.

SAFFRON, *saf'run*, a low, bulbous plant, with grasslike leaves and large, crocuslike purple flowers, cultivated in the East and in Southern Europe for the sake of its stigmas. These, when dried, form the saffron of commerce, which has a deep orange color, a warm, bitterish taste and a sweetish, penetrating odor. As it takes the stigmas of more than four thousand flowers to yield an ounce of saffron, it has always been very expensive. Its orange-red extract is used by painters and dyers, but this is now generally displaced by cheaper coloring matters. Saffron itself is employed in cookery and confectionery as a

coloring and flavoring substance. It is no longer regarded as a drug and is of little value for medicinal purposes among the most advanced physicians.

SAGAS, *sah'gaz*, or *sa'gaz* (tales), the name given among the Icelanders to a class of prose epics—historical, mythical or romantic in context—tracing in detail events in the lives of Icelandic heroes and rulers. Originally they were composed for oral recitation on festive occasions, and before the twelfth century were preserved only in the memories of the people, which accounts for the varying versions of the same events. Between the twelfth and fifteenth centuries many of these detached tales were collected, amplified or curtailed, and worked into a series of consecutive narratives.

The sagas of the west of the island are the more elegant in style, probably because of Celtic influence. Among the more important sagas are the *Saga of Gishi*, the outlaw; that of the hero and poet Egill; the *Laxdoela Saga*, the story of the Icelandic heroine Gudrun; the *Saga of Grettir the Strong*, and the *Saga of Nial*, a complex saga of great legal and historical value. A number of the most interesting sagas are to be had in English translations, but their authorship in many instances is unknown.

SAGE, *sayj*, a perennial garden herb, cultivated for its leaves and stems, which contain an essential oil, valuable as flavoring. It grows in temperate and warm regions, in dry soil, and may be propagated by slips or cuttings. In some sections of the United States a tea made from sage leaves is drunk as a tonic and as an aid to digestion. The plant has a much wider use as a flavoring. The best known species, the common *garden sage*, is a little shrubby plant, with rough, grayish leaves and small bluish flowers. *Meadow sage* is common in meadows of both Europe and America.

SAGE, RUSSELL (1816-1906), an American financier, born at Shenandoah, N. Y. He was reared on a farm, received a public-school education and in his young manhood held various minor political offices. From 1853 to 1859 he was a Whig member of Congress, and soon afterwards he moved to New York and became associated with Jay Gould in railroad operations. He left his entire fortune of \$50,000,000 to his wife, Margaret Olivia Slocum Sage, to be used by her without restriction.

Margaret Olivia Slocum Sage (1828-1918), wife of Russell Sage and one of the foremost of American philanthropists. She was born at Syracuse, N. Y., and educated at Troy Female Seminary. In 1907 she established, the Russell Sage Foundation, "for the improvement of social and living conditions in the United States," and endowed it with a fund of \$10,000,000. Out of this fund model apartments have been erected in New York to replace tenements, and much reform work along social and educational lines has been financed; a model community has been established on Long Island and an island has been purchased in the Gulf of Mexico for the protection of birds. At her death Mrs. Sage left practically all of her estate to the furtherance of philanthropy and education. See RUSSELL SAGE FOUNDATION.

SAGEBRUSH, the name of a group of dry shrubby plants, belonging to the composite family. Sagebrush is the characteristic vegetation of the arid and desert regions in the western part of the United States, and in some localities it forms the only vegetation found on large areas. There are several varieties, known as *black sage*, *white sage* and *silvery sage*, but all bear the same general characteristics. The plants grow from six to twelve feet high, and have a straight, stiff stem bearing a profusion of small wedge-shaped leaves and clusters of small flowers at the top of the branches.

Nevada is popularly known as the *Sagebrush State*, because of the large portions of the state covered with this plant.

SAGE GROUSE, the largest of American grouse, yet found on the sagebrush plains of Western North America and in mountain valleys. When fully grown it is about two and one-half feet in length. On each side of the neck of the male is an inflatable sack, like that of the prairie chicken (see GROUSE). The flesh of the sage grouse is usually tainted by its food, which renders the taste unpleasant.

SAGHALIEN. See SAKHALIN.

SAGINAW, MICH., third city in size in the state and the county seat of Saginaw County, sixty-five miles northeast of Lansing and 100 miles northwest of Detroit, on the Saginaw River, at the head of deep-water navigation, eighteen miles from Saginaw Bay, and on the Grand Trunk, the Pere Marquette and the Michigan Central railroads. The educational institutions include Germania Institute, a free manual training school, a trade

school, and the Hoyt and the public libraries, a natatorium and an auditorium. The city contains the Saginaw, Saint Mary's, Women's and the detention hospitals, a home for the friendless and Saint Vincent's Orphanage. Some of the other prominent buildings are the courthouse, the postoffice, the city hall, the Masonic Temple, Y. M. C. A. and Y. W. C. A. and an Elks' Temple.

Saginaw was formerly one of the greatest lumber-manufacturing centers in the country, and it still has a very extensive lumbering industry. The future of the city depends chiefly upon the extensive coal fields and upon the rich agricultural country, which is especially productive of sugar beets. There are also valuable salt deposits in the vicinity. The city contains beet-sugar mills, glass works, iron, steel and wood-working factories, furniture, steering gears, silos, flour mills and a large number of wholesale houses. The town was laid out in 1836, and was incorporated in 1851. Saginaw was created in 1890 by the consolidation of Saginaw City and East Saginaw, which are on opposite sides of the river. The city adopted the commission form of government in 1914. Population, 1910, 50,510; in 1920, 61,903, a gain of 23 per cent.

SAGITTARIUS, *saj i ta'ri us* (the archer), a southern constellation or sign of the Zodiac, represented by the Archer's arrow and part of the bow (♐). The sun in its revolution enters the sign of Sagittarius about November 22.

SA'GO, a food-starch obtained from the trunk of several species of palms which grow in the East Indies. The palm from which



SAGO PALM

the finest sago is prepared forms immense forests on nearly all the Moluccas, each stem

yielding from about 100 to 800 pounds of sago. The tree is about thirty feet high and from eighteen to twenty-two inches in diameter.

The trees devoted to the production of sago are not permitted to come to full maturity, as the ripening of the fruit saps the starchy center, leaving the trunk a hollow shell, which kills the tree. After cutting down, the woody parts of the tree are separated by washing, and the meal is dried.

For exportation the finest sago meal is mixed with water and then rubbed into small grains of about the size and form of coriander seeds. The Malays have a process for refining sago which also gives it a fine pearly luster, this method being unknown to Europeans; but there are reasons to believe that heat is employed, as the starch is partially transformed into gum. Sago forms a light, wholesome, nutritious food, and it is also used largely in the manufacture of soluble cocoas and for adulterating the common varieties of arrowroot. See **STARCH**.

SAGUENAY, *sag eh na'*, **RIVER**, a river of the province of Quebec and one of the largest tributaries of the Saint Lawrence, has its source in a number of streams flowing into Lake Saint John, from which the Saguenay issues. The river has a length of 110 miles, flows in an easterly direction, and enters the Saint Lawrence 120 miles northeast of Quebec. There are numerous rapids and cascades in the first forty miles of its course, but from Chicoutimi it is navigable for small steamers, and from Ha Ha Bay, sixty miles above its mouth, for large steamers. In its lower course the Saguenay is from three-fourths of a mile to two miles wide, and from 800 to 2,000 feet deep. From Ha Ha Bay to the Saint Lawrence it flows through an unbroken chasm of rock with nearly vertical walls, which vary in height from 300 to 1,800 feet. The river is famous for the grandeur of its scenery. Tadusac, at its mouth, and Ha Ha Bay are summer resorts.

SAHARA, *sa hah'ra*, the largest desert on the earth's surface, occupying the greater part of Northern Africa. It extends, roughly, from the Atlantic Ocean, on the west, to the Nile basin, on the east, and from the Sudan, on the south to the Atlas Mountains and, in places, to the Mediterranean sea, on the north. The arid region east of the Nile is a part of the desert. The entire area of

the Sahara is more than 3,500,000 square miles—almost as extensive as the mainland of Europe and quite equal in extent to the Dominion of Canada.

Its Surface. The Sahara is not, as many suppose, a vast, flat expanse of burning sand. On the contrary, the surface presents considerable variety. As a whole, this desert is a table-land, in elevation from 1,300 to 1,600 feet above the sea. In limited areas it drops to 500 feet, and there are a few depressions below sea level. The great central plateau, from 1,000 to 2,500 feet high, extends in a northeast—southwest direction three-fourths of the desert's length. It is crossed by three mountain ranges, the Tibesti, the Air and the Ahaggar, which rise to heights ranging from 6,000 to 9,000 feet. In winter they are snow-capped. The western part of the desert is chiefly rock-strewn plains, and the northern and eastern parts, the latter known as the Libyan Desert, are a vast expanse of sandy waste. Here are vast areas of glistening sand which is swept into fantastic and sometimes beautiful shapes by frequent strong winds—great hollows like the craters of volcanoes, gigantic drifts from 300 to 400 feet high, that rise like petrified waves above the surrounding levels. On these trackless wastes of shifting sand there is no animal or vegetable life except in the few oases.

Caravan Routes. The oases occur wherever water from underground natural reservoirs comes to the surface in the form of a spring and gives rise to vegetation. Here date palms grow luxuriantly—for the soil of the desert is everywhere fertile and needs only water to make it productive. Where the supply of water is sufficient to support a settlement, villages have sprung up, wheat, millet and barley are cultivated, and vegetables and fruits are grown; cotton also is raised, this being the chief fiber for weaving. Except for the oases, travel across the desert would be impossible, and the trade between the Sudan and the Barbary States would be almost entirely cut off. As it is, there are numerous well-marked caravan routes across, leading from Timbuktu and other cities of the Niger and from settlements on Lake Chad, to the Mediterranean ports. The desert has one important natural resource—salt, vast deposits of which occur in the southern part.

Climate. The Sahara has two seasons—winter, four months long, and summer, eight months in duration. In the central mountains

there is considerable rainfall, but the water, instead of running off in rivers, flows a short distance and then sinks into the sand. The climate of the north varies somewhat from that of the south. In the hot season the temperature rises to 120 degrees. The temperature falls sometimes forty degrees after nightfall. On the plateau water sometimes freezes at night, even after a very hot day. The entire desert is much visited by storms, which because of the quantities of sand they lift into the atmosphere are very dangerous. Sometimes these storms are so severe they cause the suffocation of travelers and camels.

Life in the Desert. Wild animals are rare in the Sahara. About the oases and on the outskirts there are lions, panthers, wolves, foxes, hyenas and jackals. Lizards and venomous serpents are numerous, and in the interior are found the jerboas, or jumping mice. The desert is the natural home of the camel, and this is the chief domestic animal, although a few donkeys, horses, goats, sheep and cattle are raised.

The Sahara is inhabited by a mixed people. In the west are the Berbers, or desert Moors; in the central region are the Tuaregs, who prey upon caravans; in the east are negroes and Bedouins.

SAIGON, *si gohn'*, COCHIN-CHINA, the capital of the French colony of Cochin-China and one of the finest cities in Asia, is situated on the Saigon River, thirty-five miles from its mouth. It is connected with Mekong by canal and with Mytho by rail. The river is navigable at high tide, and the city has a navy yard, a dry dock and repair docks, besides extensive wharves. It consists of two parts, the commercial town and the native town. It is regularly built and has good modern buildings, surrounded by gardens, as well as pleasant promenades. The chief structures are the citadel, the government palace, the arsenal, the astronomical observatory and the buildings of a number of colleges. The city also maintains botanical and zoological gardens. The trade is large and is carried on with the Dutch East Indies, the Philippines and with numerous ports of Asia and Europe. It is also an important center of rice manufacture. Population, 1913, estimated 72,000.

SAILBOAT AND SAILING. A small row boat can be converted into a sailboat by having a mast raised and a sail attached to it, but such a boat will not sail in a satis-

factory manner because it has no center board or keel to prevent it from drifting with the wind. To overcome this difficulty a board, called the *lee board*, is hung to the lee side of the boat, that is, the side away from the wind. This will, in a measure, take the place of a center board. The mast should be of pine or spruce, ten feet long and about three inches in diameter at the base and a little smaller at the top. To put or "step" the mast, cut a hole the diameter of the mast in the center of the forward seat, and directly beneath this nail a block in which the base of the mast may rest. The hole in the block need not be more than two inches in diameter. Cut the mast down to fit it. This support will be strong enough for the mast of a small boat. Attach a boom of the mast so that it will readily slide up and down. The boom should be about twelve feet long and much smaller and lighter than the mast. Unbleached cotton sheeting is the best and least expensive material for a sail. The sail may measure eleven feet at the bottom and should be nine feet high. It should be hemmed on all sides and fastened to the mast by rings, so it will readily slide up and down. It is raised and lowered by means of a cord passing over a pulley at the mast head. An oar can be used for a rudder.

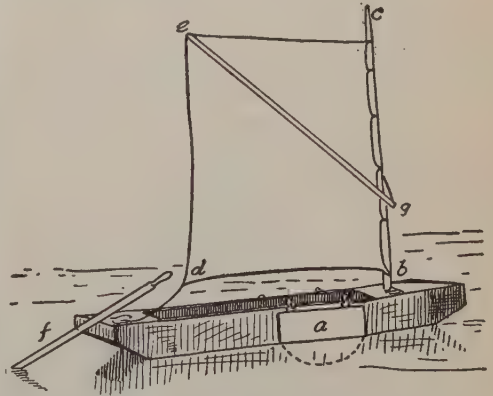


FIG. 1.

a, lee board; b, mast; c, loop in sail; d, sprit; e, oar used as a rudder.

There is little difficulty in sailing a boat directly before the wind, but in most cases the navigator wants to sail in a direction different from that in which the wind is blowing, and he must learn to manage his sail and rudder, that he may sail his boat to the desired haven. A flat-bottomed boat or punt

(Fig. 1) is the safest for a beginner. (See page 482).

In Fig. 2 the wind is blowing in the direction of the arrow. The boat at A desires to sail to B. Obviously it cannot sail directly

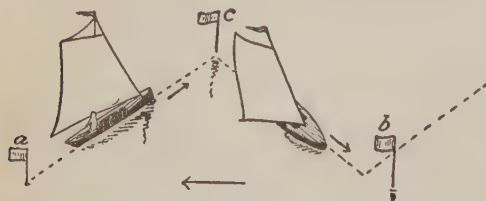
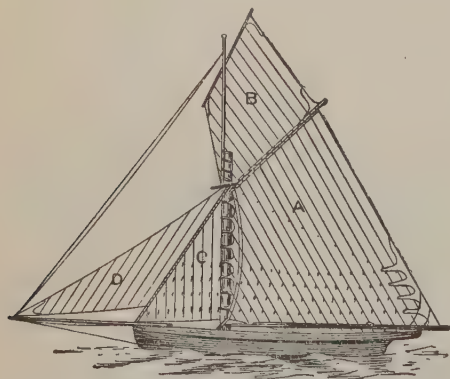


FIG. 2.

against the wind, and it must, therefore, take a zigzag course, or *tack*. When the sail is placed in the position seen at A, the boat is driven towards the stake C. When it reaches C the navigator turns into the wind and shifts the sail to the position shown at right, and is driven towards B, the point it is to reach.

Sails. Sails for larger boats are usually made of several breadths of canvas, sewed together with a double seam at the borders and edged all round with a cord or cords, called the *boltrope* or *boltropes*. A sail extended by a yard hung by the middle is called a *square sail*; a sail set upon a gaff, boom or stay, so as always to hang more or less in the direction of the vessel's length, is called a *fore-and-aft sail*. The upper part of every sail is the *head*; the lower part the *foot*; the sides are called *leeches*. The two lower corners of a square sail are called *clues* and are kept extended by ropes called *sheets*.



SAILS OF A CUTTER YACHT

Sails generally take their names, partly at least, from the mast, yard or stay upon which they are stretched; thus, the main course, or mainsail, the main topsail, the main topgallant sail, are, respectively, the sails on the

mainmast, the main topmast, and the main topgallant mast. In the accompanying diagram of the sails of a cutter yacht, A represents the mainsail; B, the gaff topsail; C, the foresail, and D, the jib.

SAINT AUGUSTINE, *aw'gus teen*, FLA., the county seat of Saint John County, on San Sebastian River and Matanzas Sound, thirty-six miles southeast of Jacksonville, and on the Florida East Coast Railroad. The town occupies a low site, only a few feet above the level of the sea, is an important winter resort and contains many large hotels. There are also numerous gardens containing subtropical plants, and oranges and other subtropical fruits are grown in the surrounding country. There are railroad shops and cigar factories. The remains of Fort San Marco, or Fort Marion, begun in 1656, are still in existence. There are also ruins of an old wall and city gate built by the Spaniards in the sixteenth century. Saint Augustine was settled by the Spaniards in 1565, and is the oldest town in the United States. The commission form of government was adopted in 1915. Population, 1910, 5,494; in 1920, 6,192, a gain of 13 per cent.

SAINT BARTHOLOMEW, MASSACRE OF. See BARTHOLOMEW'S DAY, SAINT.

SAINT BERNARD, *sahN bur nahr'*, GREAT, a celebrated Alpine pass in Switzerland, canton of Valais, on the mountain road leading from Martigny, in Switzerland, to Aosta, in Piedmont. The altitude is 8,150 feet at the highest point. Almost on the very crest of the pass is a famous hospice, next to Etna observatory the highest inhabited spot in Europe. The hospice was founded in 962 by Saint Bernard of Menthon. It is the mission of the resident monks, with the aid of Saint Bernard dogs, to rescue travelers who are lost in the snows on the mountains. The pass was much used by the Romans. In May, 1800, Napoleon led an army of 30,000 men, with artillery and cavalry, into Italy by this pass.

Little Saint Bernard, a mountain in Italy, belonging to the Graian Alps, about ten miles south of Mont Blanc. The pass across it, one of the easiest in the Alps, is supposed to be that which Hannibal used. It is 7,170 feet above the sea.

SAINT BERNARD, *bur'nahr'd*, DOGS, a breed of large dogs named for the hospice of Saint Bernard in the Alps (see above), because the monks of this hospice train the

dogs to rescue travelers overcome by the snowstorms in the mountains. The dogs carry a bottle of brandy tied around their necks, and their sense of smell is so keen that



SAINT BERNARD DOG

they can detect a body buried several feet under the snow. When a traveler is found the dog calls for assistance by barking.

There are two varieties, the smooth-coated and the shaggy coated. The coat is usually white, with patches of black or brown. The standard breed has a tall, strong, erect figure, large head and intelligent expression. The Saint Bernard is the largest of domestic dogs; the best specimens are nearly three feet high and weigh 150 pounds.

SAINT BONIFACE, MAN., on the Red River, opposite Winnipeg, with which it is connected by four bridges. Three great systems, the Canadian National, Canadian Pacific, and Great Northern, and an electric railway serve the city. The surrounding country is an agricultural section and sends great quantities of wheat to the mills of Saint Boniface. Besides flour, meat and meat products, lumber, linseed oil and building materials are the important manufactures. The Union stockyards plant is valued at more than \$1,000,000, and the new Broadway bridge to Winnipeg was built at a cost of \$600,000. Saint Boniface is the seat of the Roman Catholic see of Manitoba. A Jesuit college, an academy for boys, two collegiate institutes, and a normal school are here. Population, 1901, 2,019; in 1921, 13,816.

SAINT CATHARINE'S, ONT., the county seat of Lincoln County, on the Welland Canal and on the Canadian National Railway and several electric lines. The city is twelve miles northwest of Niagara Falls. It is the seat of Bishop Ridley College, and there are a collegiate institute, an armory, county buildings and a city hall. The town has about eighty industries, including machine shops, paper mills, flour and planing mills, electrical machinery, canning factories and

flax and silk mills. Electric power is developed in Niagara. Population 1921, 19,881.

SAINT CHARLES, MO., the county seat of Saint Charles County, fifteen miles northwest of Saint Louis, on the Missouri River, twelve miles from its mouth and on the Missouri, Kansas & Texas and the Wabash railroads. The city is in a rich agricultural region and contains a large car foundry, besides manufactures of engines, shoes, flour, brick, tile, furniture and other articles. There is also a considerable trade in limestone, tobacco, corn and other farm products. It is the seat of the Lindenwood Female College, Saint Charles Military College, and Sacred Heart Academy. There is also a home for epileptics, a library, a hospital and a county building. The place was settled in 1769 and was incorporated in 1849. For a few years the town was the capital of the Northwest Territory and later of Missouri (1820-1826). Population, 1910, 9,437; in 1920, 8,503, a loss of 10 per cent.

SAINT CHRISTOPHER, *kris'toh fer*, or **SAINT KITTS**, a volcanic island of the Lesser Antilles, British West Indies, discovered by Columbus in 1493 and colonized by the English in 1623. It covers an area of sixty-eight square miles and together with the adjacent islands, Nevis and Anguilla, forms the Leeward Islands. It is traversed by mountains, of which the loftiest is the extinct volcano Mount Misery, 4,000 feet high. The capital is Basseterre, a seaport with an open roadstead. See *TRAVELS IN DISTANT LANDS*, subhead *Among the Lesser Antilles*.

SAINT CLAIR, ARTHUR (1734-1818), an American soldier, born and educated in Scotland. He reached America as an ensign in the French and Indian War, and took part in the expedition against Louisburg and Quebec. After this war he engaged in manufacturing in Pennsylvania, but at the outbreak of the Revolutionary War was made brigadier-general of the Pennsylvania militia. He organized the New Jersey troops that fought at Trenton and Princeton. In 1777 he was made major-general and given command of Ticonderoga, but evacuated the fort on the approach of Burgoyne. For this act he was court-martialed, but acquitted. Later he fought with Greene in the South. He was elected to Congress, and in 1887 became president of that body. Saint Clair was the first governor of the Northwest Territory, and two years later became commander in

chief of the army of the United States. In 1789 he commanded the expedition against the Miami Indians, but his forces were disastrously defeated. He resigned his commission in 1792.

SAINT CLAIR, LAKE, one of the chain of the Great Lakes, but because of its small size not generally included as one of that group. It is joined to the great waterway on the north by Saint Clair River, which flows from Lake Huron, and on the south by the Detroit River, which connects with Lake Erie. The area of the lake is 396 square miles; the greatest length is thirty miles, the greatest breadth, twenty-four miles. A number of islands render the lake and river above it picturesque. See **GREAT LAKES**.

SAINT CLOUD, MINN., the county seat of Stearns County, sixty-five miles north of Minneapolis, on the Mississippi River. It is on the Northern Pacific and the Great Northern railroads, and has railroad shops of the latter line. The city is in a grain-growing and stock-raising district, and has large granite quarries which employ 900 men. There is a valuable trade, and the rapids in the Mississippi furnish good water power. There are flour mills, foundries, machine shops, and woodworking establishments. The city has the state reformatory and a state normal school. It also has six small parks, a Carnegie Library, a Federal building, a state reformatory, a hospital and a home for the aged. The place was settled about 1852, and was incorporated in 1868. The commission form of government was adopted in 1912. Population, 1910, 10,600; in 1920, 15,873, a gain of 50 per cent.

SAINTE ANNE DE BEAUPRE, *bo pra'*, **QUEBEC**, a village of Montmorency County, situated at the junction of the Sainte Anne and Saint Lawrence rivers. For over two centuries Sainte Anne has been known as a Roman Catholic shrine, and many miraculous cures are said to be performed through the intercession of the saint. In the basilica are great piles of crutches cast aside by pilgrims. The permanent population is about 2,500, but on such feast days as that of Sainte Anne (July 26) over 25,000 have often been present. About 200,000 pilgrims visit the village each year.

SAINT ELIAS MOUNTAINS, a range of mountains located in the southeastern part of Alaska and the northwestern part of Canada, comprising a broad, elevated chain,

with numerous peaks and short ridges. Mount Logan, 19,500 feet high, is the highest peak. Mount Saint Elias is 18,026 feet high. Other prominent peaks to the southeast are Mount Fairweather, Mount Cook and Mount Vancouver. This range of mountains gives rise to numerous glaciers, the largest being the Malaspina.

SAINT ELMO'S FIRE, an electrical display in the form of a circle of light sometimes seen during thunderstorms about the tops of spires and trees, and the masts of ships. It is common in southern regions, and rarely may be seen on the manes of horses and about the human head. Sailors regard Saint Elmo's fire as a friendly omen, and among the ancient Greeks it gave rise to the myth of Castor and Pollux. See **CASTOR AND POLLUX**.

SAINT ETIENNE, *saN a te en'*, **FRANCE**, is situated in the department of Loire, on the Furens River, thirty-two miles southwest of Lyons. The town stands in the center of one of the most valuable mineral fields of France; and in addition to having extensive collieries, blast-furnaces and other iron works in the vicinity, it manufactures silks, cutlery and firearms, and is one of the largest centers in the world for the manufacture of ribbons, the yearly output of which exceeds \$12,000,000 in value. The collieries alone employ about 16,000 men. Population, 1921, 167,967.

SAINT GAUDENS, *gaw'denz*, **AUGUSTUS** (1848-1907), the most distinguished of



SAINTE ANNE DE BEAUPRE

American sculptors, largely credited with the development of a distinctive plastic art in the United States. Born in Dublin, he was taken

to America when three months old. His early years were spent in the employ of a cameo cutter, but he later studied in New York, Paris and Rome. It was in the latter city that he executed his first statue, *Hiawatha*. Among other notable productions are *Admiral Farragut*, in New York; *Abraham Lincoln*, in Chicago; and the statue of *Diana*, which was placed on the roof of the Agricultural Building at the World's Columbian Exposition, Chicago, 1893. The *Shaw Memorial*, on Boston Common, and the bronze equestrian statue of *Sherman*, in Central Park, New York, counted among the half dozen finest equestrian statues in the world, are the most celebrated of the sculptor's works. Saint Gaudens is equally famed for the rare charm of his low reliefs, the most notable being those of Bastien-Lepage and Robert Louis Stevenson.

SAINT GEORGE AND THE DRAGON, a legend of the patron saint of England, symbolizing the conquest of paganism by Christianity. According to the story, the country had been terrorized for years by a dragon which, after having exacted the sacrifice of all the sheep in the land, was demanding its daily toll of human lives. One day as Saint George was riding across a marsh he encountered a procession led by the king's daughter, clad in bridal attire, who was to be the next victim. Saint George promised the people deliverance, and charging upon the approaching dragon, injured it with his magic sword Ascalon. The dragon at once became weak and meekly followed the procession to the market place, where Saint George killed it with his sword. Saint George then told the people that it was God's power which had enabled him to conquer the demon, and he exhorted them to give up their idols and accept Christianity. The princess later married her brave knight rescuer. Edward III of England made Saint George the patron of the Knights of the Garter, and one of the insignia of that Order is a jeweled figure represented as slaying the dragon. A Russian Order of Saint George was founded by Catharine II in 1769. Raphael's painting of the slaughter of the dragon hangs in the Louvre, Paris.

SAINT GEORGE'S CHANNEL, the arm of the Atlantic Ocean which separates Ireland from Wales and connects the Irish Sea with the Atlantic Ocean. It extends from Holyhead and Dublin, on the north, to Saint

David's Head and Carnsore Point, and is about 100 miles long, with breadth varying from sixty to ninety-five miles.

SAINT GOTTHARD, *saN go tahr'*, a mountain group in Switzerland, belonging to the Lepontine, or Helvetian, Alps, which it connects with the Bernese Alps. Monte Leone, the highest peak, is 11,694 feet in altitude. Other high peaks are Waserhorn, 10,727 feet, and Bortelhorn, 10,481 feet.

Saint Gotthard Tunnel, a tunnel through the Saint Gotthard Pass, in the Alps, affords railway communication between Italy and Germany. It is $9\frac{1}{2}$ miles long, 26 feet wide and $21\frac{1}{2}$ feet high. The tunnel is lined with masonry throughout its entire length. The roof is a brick arch, and the sides are of rubble. The expense of construction was assumed jointly by the governments of Italy, Switzerland and Germany. At its highest point this tunnel is 3,786 feet above sea level and 3,150 feet below the surface of the mountain. The entrances are reached by spiral tunnels, through which the railway ascends.

SAINT HELENA, *hel é'na*, a British island in the South Atlantic where Napoleon lived in exile from 1815 to his death, May 5, 1821 (see NAPOLEON I). It covers an area of forty-seven square miles and is situated 1,200 miles west of the nearest African coast. Many vessels make it a halting place, as it is in the direct line of ocean communication by way of the Cape of Good Hope. About one-fifth of the entire surface is available for cultivation, which is given over to farm and garden produce. The population, which approximates 3,550, consists of mixed Europeans and natives of Africa and of the East Indies. Jamestown is the port and only town of the island.

SAINT HYACINTHE, *QUE.*, the county seat of Saint Hyacinthe County, on the Yamaska River, which almost encircles the city, and on the Canadian National, the Canadian Pacific, and the Quebec, Montreal & Southern railways. Saint Hyacinthe has excellent schools and is the seat of a seminary, two convents, the Academie Prince for girls and Academie Girouard for boys. It also has a branch of the Sacred Heart College of Athabaska and the provincial dairy school, probably the first dairy school in Canada. The principal manufacturers are boots and shoes, threshing machines, musical instruments, corsets, biscuits and knit goods. Population, 1911, 9,797; 1921, 10,852.

SAINT JOHN, N. B., the county town of Saint John County and largest city of the province, is situated on the southern shore of the province, on a peninsula overlooking the Saint John River and the Bay of Fundy, 245 miles by rail northwest of Halifax. It is on the Canadian National and Canadian Pacific railways. The city is regularly laid out and contains a number of good buildings. It ranks very high among the shipping centers of the world, and it has direct steamship connection with London, Liverpool, Glasgow, Bristol, Dublin, Belfast, Havre, Antwerp, South Africa, and the West Indies. Its annual trade amounts to more than seventy millions of dollars. The harbor is owned and managed by the city. It is free from ice throughout the year. The leading industries of the town include the manufacture of cotton and woolen goods, boots and shoes, machinery, tools, wooden ware, carriages, agricultural implements, lumber, paper, soap and candles. The fisheries are also important, giving employment to several hundred men. Saint John was chartered in 1785. It was nearly destroyed by fire in 1877 but was rapidly rebuilt. Population in 1911, 42,511; in 1921, 47,166.

SAINT JOHN OF JERUSALEM, KNIGHTS OF. See JOHN, KNIGHTS OF SAINT.

SAINT JOHN RIVER, often called the "Rhine of America," is the largest river in the province of New Brunswick. It was so named by Champlain and De Monts in honor of John the Baptist. It originates from two branches, one rising in the northern part of Maine and the other in the province of Quebec, and flows northeastward and then southeastward, entering the Bay of Fundy. Its length is about 500 miles, and for 225 miles it is navigable for small steamers during high water, while larger boats ascend the river as far as Fredericton. In the upper part of its course the Saint John forms a portion of the boundary between Maine and the provinces of Quebec and New Brunswick. The city of Saint John is situated at its mouth. At Saint John, just before the river enters the Bay of Fundy, are the noted Reversing Falls.

SAINT JOHN'S, NEWFOUNDLAND, the capital of the province, is situated on the northern point of the southeastern peninsula of the island, 550 miles northeast of Halifax, on the Newfoundland Railway. The city occupies a commanding site, which rises

abruptly from the harbor, which is landlocked and guarded by modern fortifications. Among the chief public buildings are the Roman Catholic cathedral, the Anglican cathedral, the house of parliament, the post-office and government house, Saint John's Athenaeum and Saint Bonaventure College. The inhabitants are chiefly engaged in fisheries and in the refining of seal oil. Other industrial establishments worthy of mention include foundries, machine shops, tanneries, soap factories, and manufactories of boots and shoes. It is an important station for the Atlantic whaling and sealing fleets. Population, 1911, 32,292; in 1918, estimated, 34,045.

SAINT JOHNS, QUE., the county town of Saint Johns County, is situated on the Richelieu River, twenty-seven miles southeast of Montreal, and on the Canadian National, Central Vermont and the Canadian Pacific railways. The leading manufactures include furniture, sewer tile, sewing machines, silks, straw hats, and umbrellas. The city also has an important lumber and grain trade. Population, 1911, 5,903; in 1921, 7,734.

SAINT JOHN'S RIVER, a river in Florida about 350 miles in length, flowing northward almost parallel to the coast and emptying into the Atlantic sixteen miles east-northeast of Jacksonville.

SAINT JOSEPH, Mo., the county seat of Buchanan County, and the third city of the state, smaller than Saint Louis and Kansas City. It is on the Missouri River, sixty miles northwest of Kansas City, and on the Atchison Topeka & Santa Fé, the Chicago, Rock Island & Pacific, the Hannibal & Saint Joseph, the Kansas City, Saint Joseph & Council Bluffs, the Chicago, Burlington & Quincy, the Chicago Great Western, the Missouri Pacific and Saint Joseph & Grand Island railroads. The town is connected by a steel bridge with Elwood, Kan., over 4,200 feet long. It is built along the bluffs, close to the river, on which it has a frontage of about three miles. Among the important buildings are a Carnegie Library (there are also two other libraries), a courthouse, the Live Stock Exchange, a postoffice, a city hall, an auditorium, Y. M. C. A. and Y. W. C. A. buildings, a large hotel and several imposing business blocks. One of the state hospitals for the insane is located here, also the state fish hatchery. The educational institutions include two medical colleges, Sacred Heart

Academy and a number of private and parochial schools. The leading charitable institutions are the Memorial Home for Aged People, Saint Joseph's Hospital, Ensworth Hospital and Noyes Hospital. Among the educational institutions are a Junior College and three Catholic schools. There are three high schools.

Saint Joseph is the third industrial city of the state. The chief industries are connected with slaughtering and meat packing, and the amount of business done by the packing houses exceeds \$70,000,000 each year. Other important industries include the manufacture of overalls and shirts, harness, collars, saddles, plows, trunks, furniture, shoes, flour, woolen goods, machinery and foundry products.

The first settlement was made in 1826 by an indian trapper and trader. The first post-office was established in 1840, and the town was laid out in 1843 and given its present name. It became the county-seat three years later and in 1851 was chartered as a city. During the emigration to the California gold fields, Saint Joseph was an important outfitting post. The commission form of government was adopted in 1909. Population, 1910, 77,403; in 1920, 77,939, a gain of less than one per cent.

SAINT KITTS. See SAINT CHRISTOPHER.

SAINT LAWRENCE, GULF OF, a large indentation of the Atlantic Ocean, separating Newfoundland from New Brunswick and Nova Scotia, and extending into the province of Quebec. Next to the Gulf of Mexico, it is the largest gulf on the Atlantic coast. It is partially enclosed by Newfoundland and Cape Breton Island, and it communicates with the Atlantic by three channels—the Strait of Belle Isle, separating Newfoundland from the mainland; the Strait of Canso, between Cape Breton and Nova Scotia, and Cabot Strait, sixty-three miles wide, forming the main outlet. Anticosti and Prince Edward Island are the largest islands in the gulf; besides these, there are the Magdalens and a number of other small groups. As the outlet of the Saint Lawrence River, this gulf forms the entrance to the chief waterway to the interior of Canada, and is of great commercial importance. It was discovered and named by Jacques Cartier in 1536.

SAINT LAWRENCE RIVER, one of the largest rivers of North America, which with its tributaries drains the basin of the Great

Lakes and the southeastern part of Canada, an area of 500,000 square miles. The Saint Lawrence is generally supposed to rise in Lake Ontario, from which it flows in a broad channel, but its real source is the Saint Louis River in the northeastern part of Minnesota, which enters Lake Superior at Duluth. The Saint Mary's River joins Lake Superior and Lake Huron, the Saint Clair River, Lake Saint Clair and the Detroit River form the connection between Lake Huron and Lake Erie, and the Niagara River flows from Lake Erie to Lake Ontario.

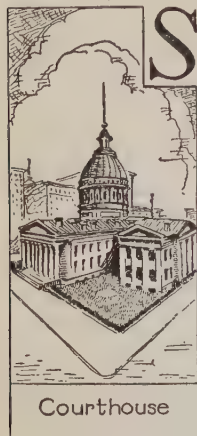
The Saint Lawrence is one of the great rivers of the world; some authorities consider it second only to the Amazon in the volume of water it discharges. The main stream extends from Lake Ontario to the Gulf of Saint Lawrence, and is about 750 miles long. The average width of its channel is one and one-fourth miles, but in a number of places there are broad expanses called *lakes*. The largest of these are Lake Saint Francis, thirty miles above Montreal, and Lake Saint Peter, between Montreal and Quebec.

Between Lake Ontario and Montreal there are a number of rapids caused by the outcropping of layers of rock in the bed of the River. The Long Sault, the Cascades, the Cedars and the Lachine, just above Montreal, are the most noted. Light river steamers going down stream pass through the rapids with safety, and the experience of "shooting the rapids" is very enjoyable to the passengers. A series of canals is used by boats going up stream. For about forty miles after leaving Lake Ontario the channel is studded with islands, forming the famous Thousand Island Park. On many of these islands there are beautiful summer residences, which add much to the beauty of the park. The chief tributaries from the north are the Ottawa, the Saint Maurice, the Montmorency and the Saguenay. Those from the south are the Richelieu and the Chaudière.

The Saint Lawrence is the only great waterway admitting ocean-going ships to the interior of the continent. Montreal, at the head of navigation, is the natural meeting place of ocean and inland traffic, and this advantage has been the chief element in the city's growth.

SAINT LEGER, *sant le'jer*, or *sil'in jer*, BARRY (1737-1789), a British soldier who fought in the French and Indian Wars and the American Revolution. He commanded the unsuccessful expedition against Fort

Stanwix in 1777 (see REVOLUTIONARY WAR IN AMERICA), and attained the rank of colonel in 1780, in which year he published his *Journal of Occurrences in America*.



Courthouse

SAIN'T LOUIS, *loo'is*, or *loo'e*, Mo., the largest city in the United States west of the Mississippi River, and sixth in population among cities of the country as a whole, according to Federal estimates. In 1910 the population was 687,029; in 1920, 772,897, nearly 100,000 gain.

General Description.

Saint Louis is situated on the west bank of the Mississippi River, twenty-one miles below the mouth of the Missouri, 283 miles southwest of Chicago, 599 miles south of Saint Paul and 709 miles north of New Orleans. On the opposite bank of the river is East Saint Louis, Ill., the second city in size in that state. The city extends along the river for a little over nineteen miles, and reaches westward for about seven miles. Its area is sixty-two square miles. The site is high and gently undulating land, which rises gradually from the Mississippi, the country to the west of it being a rolling plain of about 200 feet altitude.

The city is admirably laid out. The eastern boundary conforms to the great bend in the river, and the streets near this are parallel with the river bank; farther westward they gradually straighten and assume a north and south direction. Most of the streets crossing these extend east and west. Market Street divides the city into north and south sections for numbering, all of the streets that cross Market being called *north* on one side of it and *south* on the other side. The streets running north and south are numbered, beginning with the river and extending as far as Twenty-fifth Street. Those running east and west are named, and in numbering the buildings, each block begins a new hundred. Broadway is one of the chief streets extending north and south, and it runs parallel with the river. This and Olive Street are the fashionable promenades and also contain the leading retail stores. Washington Avenue is one of the widest and handsomest streets in the city. Near the river this is occupied by the

wholesale dry goods trade, and its western portion is given to fashionable residences. The fashionable part of the city is at the west end, and Lindell Avenue is one of the principal streets passing through it. Interesting landmarks are the old houses in which Eugene Field and U. S. Grant lived.

Parks. The public parks and squares embrace over 2,200 acres. Among the largest parks is Forest Park, on the west side, covering nearly 1,400 acres. It contains the museum of fine arts and the zoological gardens. Parts of it are heavily wooded with oak, but the western half was cleared to make room for the Louisiana Purchase Exposition. Carondelet Park, on the south side, has an area of 180 acres and is noted for its beautiful scenery. In the south-central part of the city is Tower Grove Park, still larger, containing beautiful lawns and shrubbery, and celebrated for its statues of Shakespeare, Humboldt and Columbus. Near this on the north is Shaw's Garden, officially known as the Missouri State Botanical Garden. This park is famous for its botanical garden and its arboretum, which contains all kinds of trees and shrubbery that will grow in the climate. On the north side of the city are O'Fallon Park, of 160 acres, bordering on the bluffs of the river, and Fairground Park, which contains a zoological garden, a large amphitheater and a race course. There are many smaller parks scattered about the city. Of these, Lafayette Park was formerly the most beautiful, but the tornado in 1896 destroyed nearly all of its fine trees. This park contains a fine statue of Thomas H. Benton. Forest, Tower Grove, O'Fallon and Carondelet parks are connected by fine boulevards.

Buildings. Saint Louis is well built, and its appearance gives an impression of strength and durability, rather than of ornament. Nearly all buildings are of brick or stone. The older part of the city, near the river, contains a few buildings of historic interest, in which traces of the old colonial style of architecture are still found, but they are not otherwise important. Among the public buildings is the courthouse, on Broadway, in the form of a Greek cross, surmounted by a dome nearly 200 feet high. The interior of the dome is decorated with frescoes, illustrating events in the history of the city or country. The Federal building, on Olive Street, is a magnificent structure of granite, erected at a cost of \$3,000,000. It

contains the customhouse, the United States subtreasury and the downtown branch of the postoffice. The new public library covers two blocks between Thirteenth and Fourteenth and Olive and Saint Charles. The city hall, a modern structure of brick and stone costing over \$2,000,000, occupies an entire block. To the west are the municipal court buildings, and at Market and Eighteenth streets is the Union station, one of the largest and finest buildings of its kind in the world. The Coliseum has a seating capacity of 15,000. Among the notable business blocks are the Mercantile Library, the building of the board of education, the railway Exchange, Odd Fellows' Hall, the Commonwealth Trust, the Equitable, the Boatman's Bank, the Laclede, the Union Trust, the Bank of Commerce, and the Merchants' Exchange buildings.

Other buildings of note are the new Roman Catholic Cathedral, erected at a cost of \$3,000,000; the Protestant Episcopal Cathedral, the Second Presbyterian Church, the Pilgrim Congregational Church, the Union Methodist Church, the Shaare Emeth Synagogue and the Museum of Fine Arts. The Planters' and the Southern hotels are new and commodious structures, built upon the sites of the old hotels of the same names, which previous to the Civil War were among the most famous hostleries of the Union. The Jefferson, the Hamilton, the Washington, the Majestic, the Warwick, and the Marquette are large, well-appointed hotels in newer parts of the city.

Institutions. Washington University (which see) is the leading educational institution. This occupies a beautiful site overlooking Forest Park. Next in importance is the University of Saint Louis, a Catholic institution. The city maintains a teachers' college in connection with its public schools, and there are numerous institutions of learning maintained by the various denominations. The libraries include the public library of over 415,000 volumes, occupying a building erected through the generosity of Andrew Carnegie, who gave the city \$1,000,000 for the purpose, and the Mercantile Library containing about 130,000 volumes and occupying its own building. The rooms of this library are also of interest because of their collections of paintings and statuary. The city maintains a dispensary, a hospital, an asylum for the insane and a reform school.

The state school for the blind is also located here. Besides these institutions, there are numerous others of a charitable and philanthropic nature, maintained by various organizations.

Industries. Saint Louis is the distributing point for a large section of country to the south and southwest, including Texas and Mexico. It is the terminus of more than a score of railways, and consequently has an important wholesale trade and is one of the largest centers of transshipment in the country. The Mississippi is crossed by the great Saint Louis, or Eads bridge, a structure of granite and steel, which provides a double railway track, sidewalks, a carriage road and street car tracks. The bridge leads into a tunnel for railroads, which passes for more than 4,000 feet under the business portion of the city (see EADS, JAMES B.). Three miles north of the Eads bridge is the Merchants' bridge, and between the two is the McKinley bridge. In connection with the wholesale business and the transshipment of goods is maintained the Cupples station. In this the freight entering the city over its various lines of railway is handled. The city has an important river traffic, since the river is navigable to this point at all seasons of the year.

Saint Louis is one of the largest fur markets in the United States, having begun its career as a fur-trading post. It is also a great horse, mule and tobacco market, and a leading center in the middle west for the marketing of boots and shoes. The manufacture of boots and shoes takes first rank among manufacturing enterprises, while the tobacco industries rank second. There are also immense plants engaged in the manufacture of woodenware, hardware, railway cars, clothing, furniture and hundreds of other commodities.

History. In 1763 the territory west of the Mississippi, with other American possessions, was ceded by France to Spain, but the latter did not take possession until 1770. The first settlement was made in 1764, and the village was named in honor of Louis XI of France. A year later it was made the capital of Upper Louisiana. It remained under Spanish control until 1800, when it was receded to France, and in 1803 it became a part of the United States by the purchase of Louisiana. Following this, settlers rapidly crossed the Mississippi River, and Saint Louis began to increase in population.

From the start it was a center of trade and supplies, and as the country to the west and south continued to be settled, the town increased in importance. A large number of Germans early settled in the city, and their influence on its business and institutions has always been strong. During the Civil War Saint Louis contained Union and Confederate sympathizers, though the former were in the majority. After the close of that conflict the city continued to grow and prosper. Its business interests have always been conducted on a solid financial basis and after the most conservative methods. In 1896 the city suffered from a tornado which caused widespread destruction. In 1904 it was the site of the Louisiana Purchase Exposition, the largest world's fair that had been held up to that time. An elaborate historic pageant, held in Forest Park in 1914, attracted thousands of visitors.

SAINT MARK'S, CATHEDRAL OF, a celebrated church in Venice and one of the world's most beautiful structures, faces the east side of the Square of Saint Mark's, or the Piazza. It is so named from the patron saint of the city, Mark, the apostle.

The first church on the site of the cathedral was begun in 830. This was destroyed and was rebuilt in 976. The second church was also destroyed, by fire, and in the eleventh and twelfth centuries it was reconstructed in Byzantine style. The additions made in the fifteenth century were Gothic. Until 1807 Saint Mark's ranked only as a church and was the chapel of the rulers of Venice, but since that date it has been the cathedral of the city.

The cathedral, which is about 250 feet in extent from east to west, and 170 feet from north to south, contains over 500 columns, each in richly ornamented Oriental style. In its present form it is a Greek cross, surmounted by a dome at the end of each arm and one in the center. The west front has five large porches, each so deep that the roof over them forms a spacious balcony. In front of the church are three bronze sockets, in which were formerly placed the flagstaffs which supported the banners of Venice.

The cathedral itself is a curious structure, combining several different styles of architecture. The roof is covered with small cupolas, like those of mosques, and the building contains a number of rows of arches, one above the other. The interior is finished al-

most entirely in mosaic, set in a golden groundwork. Over the central door is a mosaic of Christ, Mary and Saint Mark. In the three domes of the nave are representations of David, Solomon and the prophets; the ascension; the descent of the Holy Ghost, and the Holy Trinity. On the chancel screen are fourteen marble statues of Saint Mark, Mary and the twelve apostles. Another mosaic represents the genealogy of Mary. The church also contains many bronzes and other objects of interest, dating from the fourteenth and fifteenth centuries. See VENICE.

SAINT MARY'S RIVER, a river connecting Lake Superior with Lake Huron. It is about forty miles long, and forms the boundary between Ontario and the northern peninsula of Michigan. Its course is southeast. The famous Sault Ste. Marie Rapids form the beginning of the river, which is about a mile wide as it leaves Lake Superior. Ship canals on the Canadian and American sides enable boats to pass around the rapids. At the upper end of the rapids the river is spanned by a bridge of the Canadian Pacific Railway. The river is broad, and contains many large islands. Its shallow places have been dredged for lake vessels, and it is one of the most important waterways of the world. See SAULT STE. MARIE CANAL.

SAINT MAURICE, *mawr'is*, a river of the province of Quebec, rising in a chain of lakes and flowing southeasterly into the Saint Lawrence, at Three Rivers. It is about 350 miles long and its chief tributaries are the Ribbon and the Vermilion, from the west, and the Bastonnois and the Croche, from the east. Numerous cascades and a fall of 160 feet about twenty-two miles above its mouth add to the picturesqueness of its course.

SAINT-NAZAIRE, *saN'na-zair'*, FRANCE, one of the great seaports of the country, capital of an arrondissement (province) in the Loire region, at the mouth of the Loire River, forty miles west of Nantes. The fine harbor was enlarged during the World War, and became an important port for landing and embarkation of troops of the American expeditionary forces in that struggle. Before the war its foreign trade was worth about \$8,000,000 a year; the chief shipments were woolen goods, wine, silk and fruit, brought by rail and river from the interior, and the products of iron foundries, flour and lumber mills of the city. Population, 1911, 38,267.



The New Cathedral

SAIN'T PAUL, MINN., one of the "Twin Cities of the Northwest," the capital of the state, thirtieth city in size in the United States and second in the state, is at the head of navigation on the Mississippi River. It is 1,900 miles north of New Orleans, 410 miles northwest of Chicago, 1,340 miles from New York and 1,823 miles east of Seattle, and is served by the Great Northern, the Northern Pacific, the Chicago & North Western, the Chicago, Milwaukee & Saint Paul, the Chicago, Burlington and Quincy, the Chicago, Rock Island and Pacific, the Chicago, Saint Paul, Minneapolis & Omaha, the Chicago Great Western, the Soo Line and the Minneapolis & Saint Louis railway. The area of the city is about fifty-six square miles; it joins Minneapolis on the west.

Saint Paul proper is confined to the east bank of the river, really the north bank, since opposite the city the Mississippi flows in a slightly southeast direction. The portions across the river belong to the municipalities of West Saint Paul and South Saint Paul, though these are usually included when speaking of Saint Paul as a whole. The city occupies a beautiful site, on bluffs which rise from the river in a series of terraces. Lying on the lowest level next to the river are found the railway yards, the wharves, the union depot and most of the wholesale houses; the second level is devoted almost entirely to the retail trade, the hotels and some of the public buildings, while the highest level is occupied by residences. The city is admirably laid out, the streets being broad and nearly all of them well paved. In the residential sections they are ornamented by shade trees and lawns. Several bridges for carriages and foot passengers and a number of railway bridges cross the Mississippi.

Saint Paul has an extensive system of parks and parkways, including about eighty recreation spots, with a total area of 1,500 acres, and many miles of parkways. The most beautiful of the latter is the River Drive, extending from the end of Summit Avenue Boulevard along the bluffs of the Mississippi to Fort

Snelling. Como Park, 323 acres, is the most noted of the parks; it includes lakes and stretches of woodland, making it one of the most beautiful parks in the country. Mound Park (70 acres) and Phalen Park (216 acres), noted for their beauty and interesting features, are also important. The parkway system connects the parks with each other and with the chief centers in the city. Adjoining the city on the north are the grounds of the Minnesota Agricultural Society.

The water system provides an abundant supply of pure water, drawn from spring-fed lakes and artesian wells. The lakes are under control of the city and their shores are patrolled and the waters protected from pollution.

The city has a number of fine public buildings. Chief among these is the state capitol, occupying an eminence on the North Side (see illustration, article MINNESOTA). It is constructed of Georgia marble, with Minnesota granite for its foundation and steps, and is one of the finest buildings in the United States. Its large white dome, 220 feet high, is visible from all points of approach to the city. The interior is finished in marble and other costly varieties of stone, some of which were imported from central Africa. Among the decorations of the interior are mural paintings by John La Farge, Kenyon Cox, Edwin Howland Blashfield and other famous artists, depicting both allegorical subjects and scenes from the state's history.

Other public buildings of importance are a Federal building, a city hall and a municipal auditorium, built and owned by the city, with a seating capacity of 10,000. There are many other notable buildings, among them being a Y. M. C. A., a Y. W. C. A., the largest railway office building in the country and a great public library. There are six national banks, twelve state banks and three savings banks. A new passenger station to cost \$10,000,000, with terminals, was under construction in 1919. Merchants' National Bank, the Pioneer, the Commerce, the Germania Life, the New York Life, First National Bank, the Saint Paul Hotel and Capital National Bank buildings are noteworthy structures. The recently completed magnificent Roman Catholic Cathedral, Saint Paul's (Episcopal), the First Methodist, the Christian Scientist, the House of Hope (Presbyterian), the People's Church, the Park Con-

gregational and the First Baptist are the leading church edifices.

Among the educational institutions in the city are Hamline University, Macalester College, Concordia College, College of Saint Thomas, Saint Paul's Seminary, Saint Paul's College of Law and three Lutheran seminaries. The State College of Agriculture and the experiment station are at Saint Anthony Park, west of the city limits. The city has a public library containing 250,000 volumes, the state law library of 75,000 volumes, and the Ramsey County medical library of 10,000 volumes. Each of these is open to the public without charge. The new public library and the J. J. Hill Reference Library, together cost \$1,500,000. Public baths, as well as outdoor gymnasiums for boys and girls, are located on an island in the Mississippi.

The Ford Motor Company in 1923 purchased 167 acres of land in the city limits, adjacent to the Federal Dam on the Mississippi River, where they have constructed a ten million dollar manufacturing plant and hydro-electric station.

The location of Saint Paul at the head of navigation on the Mississippi made it an important trading post. It has been and still is the leading distributing center of the Northwest, and annually handles a wholesale trade in excess of \$500,000,000. It is the meeting place of ten trunk lines of railway, whose total mileage exceeds 50,000 miles, and has an extensive passenger and freight traffic. The leading citizen of the town, James J. Hill, was the master railroad builder of the United States.

The city is also an important manufacturing center, and the value of its manufactured products exceeds \$80,000,000 annually. St. Paul has the largest law book publishers, the largest grass carpet factory, and the largest plant for the exclusive manufacture of hoisting machinery, in the world. At South Saint Paul are located the Union Stock Yards, the center of a large meat packing industry. The city has an excellent system of street railways, with lines connecting it with Minneapolis, Stillwater and other points.

The Indian name of Saint Paul was *Inni-jiska*, which means the *white rock*. The first white settlers were French traders, who located an outpost here for trading with the Indians. It is supposed that this settlement dates from 1658. The present name dates from 1841, when Father Gaultier erected a

log chapel at the corner of Third and Minnesota streets and named it Saint Paul's Chapel. From the time that the land in the Northwest was thrown open to settlement, the city continued to grow.

Saint Paul is a city of homes, and its residence areas are beautified by shade trees and diversified by hills and valleys. From the beginning the city has been remarkably free from disaster by fire, flood or disease, and it has had a steady, conservative growth, commensurate with the growth of the Northwest. The commission form of government was adopted in 1909. Population in 1910, 214,744, an increase of over 50,000 in ten years; in 1920, 234,680.

SAINT PAUL DE LOANDA, *lo ahn'dah*, ANGOLA, also called LOANDA, is the chief city and the capital of the Portuguese colony of Angola, in West Africa. It has a large harbor, the entrance of which is obstructed by sandbars. The city was formerly the center of the slave trade between Africa and Brazil, and is a very old settlement. In the seventeenth century it was famous for its fine churches and monasteries. Among the exports are ivory, coffee, rubber, hides and palm oil. A railway connects it with Ambaca. Population, 1913, estimated, 25,500, 1,800 of whom are Europeans.

SAINT PAUL'S CATHEDRAL, in London, begun by the famous architect, Sir Christopher Wren, in 1675, and completed by him in 1710, is one of the finest domed buildings of Europe and the most imposing modern structure in England. It has the usual proportions of the English Gothic church, but is Renaissance in style, the dome being its prominent feature. The lantern terminating the dome is 360 feet above the pavement. Next to the dome, the best portion is the west front, with its portico and bell turrets.

Saint Paul's is the most magnificent of Protestant churches. The site of the present building was occupied about 610 by a Christian church, which was destroyed by fire in 1087. This was succeeded by a more splendid building, now known as "Old Saint Paul's." This, also, was burned, in the great fire of London, in 1666. The plan made by Wren for the present structure was materially modified by a decree of the clergy, which resulted in some awkward architectural compromises in the detail of the structure.

Among notable persons buried in the crypt at Saint Paul's are its architect, Sir Chris-

topher Wren, Nelson, Wellington, Collingwood, Moore, Howe, Roberts, Barry, Opie, West, Reynolds and Lord Salisbury.

SAINT PETERSBURG, FLA., in Pinellas County, twenty-one miles south of Tampa, on a peninsula which separates Tampa Bay from the Gulf of Mexico. It is on the Atlantic Coast Line and the Tampa & Gulf Coast railroads. The town is one of Florida's most important winter resorts, and claims to have sunshine every day of the year. It is governed on the commission plan, adopted in 1913. There is a Carnegie Library and a hospital. Population, 1910, 4,127; in 1920, 14,237, a gain of 245 per cent.

SAINT PETERSBURG, RUSSIA, the former name of the capital of the country, changed to Petrograd in 1914 after Russia entered the war against Germany and Austria-Hungary. See PETROGRAD.

SAINT PETER'S CHURCH, the largest and one of the most magnificent churches in Christendom, located at Rome. It is a cruciform building, in the Italian style, surmounted by a lofty dome, built on the site where Saint Peter is said to have been buried and where many Christians suffered martyrdom under the pagan emperors.

In 306 Constantine the Great erected on this spot a basilica of great magnificence. During the residence of the Popes at Avignon (1309-1376), it threatened to fall into ruins, and Nicholas V commenced work upon its reconstruction. Advance was slow until Julius II (1503-1513) decided on the erection of an entirely new building and laid the foundation stone of the new cathedral in 1506. The famous Bramante was its first architect. After his death various architects had charge of the work until the appointment, in 1546, of Michelangelo, who nearly completed the dome and a large portion of the building before his decease (1564). The nave was finished in 1612, the façade and portico in 1614, and the church was dedicated by Urban VIII in 1626.

The extensive colonnade, which surrounds the piazza and forms a magnificent approach to the church, is supported by 264 columns, 48 feet high, in four rows. The piazza is oval in form and is adorned with an obelisk over 80 feet high, of red granite brought from Egypt in the reign of Caligula, and by two magnificent fountains, the finest in Rome. The height of the dome from the floor is 435 feet, and the exterior diameter is 195 feet.

The length of the cathedral within the walls is 613 feet, the width 87 feet. The magnificent canopy over the lofty altar is 95 feet high. Near this canopy is the famous bronze statue of Saint Peter represented as seated in a chair, with right foot extended. The floor of the cathedral covers nearly five acres, and the cost is estimated to have exceeded \$50,000,000. The interior is elaborately decorated with many-colored marble columns, a few costly paintings, numerous fine mosaics, marble statuary and monuments, and it forms a valuable museum of architecture and sculpture.

SAINT QUENTIN, *kahN taN'*, FRANCE, situated on the River Somme, ninety-five miles northeast of Paris. It was formerly an important frontier post between France and the Low Countries. The buildings of note before 1914 were the church, dating from the twelfth century, the hotel de ville, the palace of justice and the museum. The industries included the manufacture of cotton and woolen goods. The city is noted for important battles, in 1557, in which the French were defeated by the Spaniards under Philip II, and January, 1871, in which the town was captured by the Germans. Its imperishable fame came in the World War, from 1914 to 1918. The Germans captured it in the early days of the war and held it until the summer of 1918, when their hordes were driven back. Bombardments reduced it to partial ruins. Population, 1911, 55,571.

SAINT-SAENS, *saN sahN'*, CHARLES CAMILLE (1835-1920), a distinguished French composer and pianist. He studied in Paris at the conservatory and won several prizes for his compositions. Later he held several important positions as organist in Paris churches, but abandoned this to devote himself to composition and concert. Although he composed several operas, of which *Samson and Delilah* is best known, his fame rests upon his instrumental music and orchestration.

SAINT SOPHIA, *so fe'ah*, the largest Mohammedan mosque in the world, and the most famous structure in Constantinople, was built for a Christian church by the Roman Emperor Justinian the Great, in whose reign it was completed, in 538. The building is rectangular, and its exterior is unattractive, but the beautiful interior makes it one of the architectural wonders of the world. The structure is 250 feet from east to west and 235 feet from north to south. The interior

is divided by piers and columns into naves and aisles, and the great hall of worship is surmounted by a dome 180 feet high and 107 feet in diameter, and supported on four arches, each having a span of about 100 feet. This dome is the most impressive feature of the structure. In the base of the dome are the windows by which the edifice is lighted. A half dome extends east and west from the cornice of the dome, so the great hall of worship is covered with a dome-shaped roof.

The walls are finished with marble of different colors, arranged in beautiful designs, and the vaulting is set in beautiful mosaic. When the church was converted into a Mohammedan mosque all Christian emblems were covered or torn from the walls.

SAINT THOMAS, one of the Virgin Islands of the United States, which were purchased from Denmark in 1917, when they were known as the Danish West Indies. Saint Thomas is one of the three principal islands of the group, the others being Saint Croix and Saint John. It has an area of twenty-eight square miles and a population (census of 1917) of 10,191. The natives are blacks. Charlotte Amalie, the capital and chief town, lies on the best harbor in the Virgin Islands. (For a description of the town, see TRAVELS IN DISTANT LANDS, subhead *Among the Lesser Antilles*.)

The harbor is situated about midway on the southern side of the island, seventy miles east of the Porto Rican town of San Juan, and 1,442 miles from New York City. It is an important coaling station for vessels bound for South America by way of the Panama Canal. Though small, the harbor is admirably protected from storms by two islands and by fringing ledges, and can accommodate vessels drawing not over thirty feet of water. Little agriculture is carried on in the island because of lack of plantation labor. The chief occupation of the natives in Charlotte Amalie is work connected with the coaling and provisioning of vessels entering the port. Honduras, a small settlement west of the town, is a fishing village of 200 inhabitants. There are no railroads. See VIRGIN ISLANDS OF THE UNITED STATES.

SAINT THOMAS, ONT., county seat of Elgin County, fourteen miles south of London, on the Canadian Pacific, the Canadian National, the Michigan Central, the Pere Marquette and the Wabash railroads. It has important manufacturing industries, and is

noted for the construction of cars and car wheels. It has a collegiate institute, an old people's home and a hospital. Population, 1911, 14,054; in 1921, 16,026.

SAINT VINCENT, *vin'sent*, one of the islands in the British West Indian colony known as Windward Islands. Its area is 150 square miles, of which one-fourth is under cultivation, and the population in 1917 was 49,422. The island is of volcanic origin and has suffered much from the eruptions of Mount Soufrière, which is about 3,000 feet high. The capital is Kingstown, on the bay of the same name, near its southwest extremity. Saint Vincent is especially noted for the excellence of its arrowroot and sea island cotton.

SAINT VITUS'S DANCE, or **CHOREA**, *ko re'ah*, a nervous disease due to the presence of an infectious germ in the brain and spinal cord. It most frequently attacks children, especially girls, between the ages of five and fifteen. It is characterized by twitchings in the muscles of the face, and jerky movements of the arms, legs, hands, feet, back and abdomen. It is usually caused by overwork, worry, lack of nutrition or excessive nervousness, but may be associated with rheumatism or diseased tonsils. The patient is unable to control the movements, which may persist for several weeks or months, though they usually stop during sleep. The disease is seldom fatal.

Treatment consists of rest from all violent physical and mental exercise, cold spongings, nourishing food, and sometimes the administration of iron and arsenic. The person affected should be placed under the care of a physician.

Saint Vitus's dance takes its name from the fact that in Europe in the sixteenth century those afflicted with the disease sought relief at the shrines of various saints, the chief of which was the Shrine of Saint Vitus.

SAKHALIN, *sa ka lyeen'*, an island off the eastern coast of Siberia, the southern portion, south of 50° north latitude, being owned by Japan. It is 600 miles long and from sixteen to 100 miles wide. It is separated from Asia by Sakhalin Gulf and by the Gulf and Strait of Tartary, and from Japan by the Strait of La Pérouse. A mountainous ridge extends throughout the entire length of the island, and the few streams, the largest of which is the Paranay, are short and rapid and abundantly stocked with fish. The soil is

not highly productive, but the dense pine forests are an important resource. Coal and petroleum exist in large quantities, and the fur-bearing animals are numerous. The principal towns are Dui, Korsakova, Rykovskoie, Muravievski and Harukimachi, the seat of government. Japan acquired the southern half of the island from Russia in 1905, and during the World War extended its control over the entire island, but by subsequent treaties relinquished its claims north of 50° parallel of latitude.

SAL'ADIN (1137-1193), a celebrated sultan of Egypt and Syria, who in 1187 caused consternation throughout the Christian world by his capture of Jerusalem. This led to the Third Crusade (see CRUSADES), and the fall of Acre in 1191. Saladin's defeats at the hand of Richard I of England compelled him to conclude a truce, which was followed by the withdrawal of Richard. The following year Saladin died at Damascus. A fine delineation of his character is found in *The Talisman*, by Sir Walter Scott.

SALAMAN'DER, a small lizardlike animal belonging to the same class as the frog and toad (see AMPHIBIANS). It has a long, slender body, a narrow, pointed tail, and



SPOTTED SALAMANDER

four straggling legs which give it the appearance of a tiny alligator. The salamander is found in Europe and North America, except in the extremely cold regions. It lives under stones or logs and in other moist places, and feeds on insects, worms and snails. The spotted salamander of Central and Southern Europe is best known. It is from six to eight inches long, and has a smooth skin with black and yellow markings. The skin is covered with glands which secrete a sticky substance believed by some to be poisonous. A species frequently found in the United States and Mexico has a black, velvety skin. Salamanders breed in the water. The young, called tadpoles, breathe by external gills, which they retain for a long time.

SAL'AMIS, a horseshoe-shaped island of Greece situated in the Gulf of Aegina, about ten miles east of Athens. It has a mountainous surface, but a fertile soil, well adapted to the cultivation of olives and grapes. The area is about thirty-six square miles. The celebrated naval Battle of Salamis was fought here in 480 B. C., in which the Persians under Xerxes were defeated by the Greeks. The chief town is Salamis, or Kuluri. In the World War construction of a new arsenal for the Greek navy was begun here.

SAL AMMONIAC, *a mo'niak*, the chloride of ammonium, now generally obtained as a by-product of gas works. The commercial article is in the form of fibrous white crystals. It is used as a remedy for stomach disorders and occasionally in cases of pneumonia. Crude sal ammoniac is used in charging electric batteries, in textile printing, in galvanizing iron and in soldering.

SALARY GRAB, the name popularly applied to an act of the United States Congress, passed in 1873, increasing the salaries of members of Congress, the President, Speaker of the House of Representatives and Associate Justices. The increase in salaries was to take effect from 1871. This back-pay legislation was the feature that gave the act its name, and also caused such a storm of indignation throughout the country that it was repealed in 1874. The increase in salaries was from \$5,000 to \$10,000, for Senators; from \$5,000 to \$7,500, for Representatives; from \$8,000 to \$10,000, for the Vice-President, Speaker and Associate Justices; and from \$25,000 to \$50,000, for the President. When the law was repealed all salaries except those of the president and the Associate Justices were reduced to their former amounts.

SALAYER, *sah li'er*, **ISLANDS**, or **SALEYER ISLANDS**, a group of about thirty small coral islands in the Indian Ocean, south of the Celebes, forming a part of the Dutch East Indian possessions. Salayer Island, the largest, covers an area of about 250 square miles. The inhabitants are Malays and number about 80,000, nearly all of whom are Mohammedans. The chief exports are ebony, teak, indigo, coffee, cotton and tobacco. The islands are especially noted for their fine breeds of horses.

SALEM, Mass., the county seat of Essex County, sixteen miles northeast of Boston, on

Massachusetts Bay, and on the Boston & Maine Railroad, the terminus of six branches. The place was first settled by Roger Conant and his associates in 1626 and is, next to Plymouth, the oldest town in Massachusetts. About 1692 the witchcraft delusion appeared in this district (see WITCHCRAFT). The town was intimately associated with many events of colonial history and contains a number of quaint old houses and irregular streets. It was the birthplace and early home of Nathaniel Hawthorne and the scene of some of the labors of Roger Williams. For many years after the Revolution, Salem was an important commercial center, and its merchants had almost a monopoly of the East Indian and China trade. The harbor, however, was not of sufficient depth, and business began to decline and the foreign trade to be transferred to Boston and New York, about the time of the War of 1812. There is still a considerable coastwise trade.

The industrial establishments are about 180 in number and include large cotton mills, tanneries, shoe factories, lead works, chemical works and other enterprises. Some of the prominent buildings are the Peabody Academy of Sciences, containing large ethnological and natural history collections; the Essex Institute, with its valuable library and historical relics; Salem Athenaeum, a public library; a city hall, a courthouse and a Masonic Temple. There are also several charitable homes for orphans and for the aged of both sexes. The city contains a state normal school, two private secondary schools, and two hospitals. On June 25, 1914, nearly a third of the city was destroyed by fire. Only a few lives were lost, but over 18,000 people were rendered homeless and the money loss was about \$10,000,000. Fortunately, the "House of Seven Gables," the Essex Institute and other historic buildings were undamaged. Population, 1910, 43,697; in 1920, 42,515.

SALEM, OHIO, in Columbiana County, sixty-five miles southeast of Cleveland, on the Pennsylvania and the Youngstown & Ohio railroads. It is in a rich agricultural and stockraising region, containing deposits of coal. There are engine works, machine shops and manufactories of pumps, stoves, furniture, tools, brick and other articles. The city has two national banks and a state bank, a Carnegie Library and a public hospital. A new high-school building was erected in 1916

at a cost of \$250,000. The place was settled in 1806, and was chartered as a city in 1885. Population, 1910, 8,943; in 1920, 10,305, a gain of 15 per cent.

SALEM, ORE., the capital of the state and its second city in size, and the county seat of Marion County, about forty-five miles south of Portland, on the Willamette River and on the Southern Pacific Railroad. It is also connected with Portland by an electric railway. The city is located on ground rising from the river; the streets are wide and beautifully shaded. Prominent buildings are the state capital (see OREGON), a city hall, a courthouse and a Federal building. State institutions are a penitentiary, reform school, school for the blind, school for deaf mutes, institution for the feeble-minded, asylum for the insane and the Government Indian Training School. The city has a business college, a normal school, a Carnegie Library and two public hospitals, Willamette University and a Methodist school. The surrounding country produces fruit, hops and wheat, and the city has manufactures of woollens, flour, loganberry juice, foundry and lumber products, machinery and other articles. Salem was laid out in 1844. Population, 1910, 14,094; in 1920, 17,679.

SALEYER, sa l'ur, ISLANDS. See SALAYER ISLANDS.

SALIC LAW one of the laws of the Salian Franks which excluded women from inheriting certain lands, probably because certain military duties were connected with the holding of those lands. In the fourteenth century females were excluded from the throne of France by the application of this law to the succession to the crown, and it is in this sense that the term *salic law* is commonly used. The application of this law to the claim of Edward III of England to the throne of France on the ground that he inherited it from his mother Isabella, daughter of Philip IV, of France, caused his claim to be rejected. See EDWARD III.

SALICYLIC, sal i sil'ik, ACID, an acid formed by the union of carbon, hydrogen and oxygen in certain proportions, and occurring in the buds of meadowsweet (*spirea*), wintergreen and birch, and in some chemical substances. When pure it occurs in fine, white, needlelike crystals. It has a sweetish acid taste. Salicylic acid is a powerful antiseptic, and it is extensively used as a preservative. Before its use in the United States

was forbidden by the government (1904) it was employed by packing houses for preserving meat. It is used in the arts in the manufacture of yellow, orange and purple dyes, for strengthening glue, and for preserving hides. Some of its compounds have a limited use in medicine.

SALINA, *sa le'nah*, KAN., the county seat of Saline County, 100 miles west of Topeka, on the Smoky Hill River and on Union Pacific, the Salina Northern, the Missouri Pacific and the Chicago, Rock Island & Pacific railroads. The city is in a fertile agricultural region and contains large grain elevators, flour mills, a brick plant, ice works, a foundry and other establishments. The Kansas Wesleyan University is located here, and the city also has a military academy, a normal school, a business college, a college of music and a Roman Catholic academy for girls. There are a Carnegie Library, a Masonic Temple, a city hall and a courthouse. Salina was settled about 1860, and was chartered as a city in 1870. Population, 1910, 9,688; in 1920, 15,085, a gain of 56 per cent.

SALISBURY, *saulz'ber e*, N. C., the county seat of Rowan County, on the Southern Railroad, 118 miles west of Raleigh. The city is in a farming and fruit-growing region, and contains railroad shops, cotton mills, hosiery works, concrete-roofing factories, veneering works, knitting mills and woodenware and other factories. Livingstone College, a state normal school for colored students, and a normal college for women are located here. A national cemetery contains the graves of more than 12,000 unknown dead. The place was settled by English churchmen from Salisbury, England, and was chartered in 1770. Population, 1910, 7,153; in 1920, 13,884.

SALISBURY, ROBERT ARTHUR TALBOT GASCOYNE-CECIL, Third Marquis of (1830-1903), an eminent English statesman, was educated at Eton, and at Christ Church, Oxford. He entered Parliament at the age of twenty-three and devoted the remainder of his life to public service. He advanced gradually until in 1866, on the formation of Lord Derby's third administration, he was appointed Secretary of State for India. The following year he resigned that office, but resumed it in the Disraeli government of 1874. He took part in the conference of Constantinople, which was expected to settle the dispute between Russia and Turkey; and at the

end of that war, having become Foreign Minister, he insisted that the treaty which Russia had forced from Turkey be submitted to a congress of the powers. In 1878 he accompanied Disraeli to the congress at Berlin, and on the death of that statesman he became the recognized leader of the Conservative party. He became Premier, as well as foreign secretary, on the fall of the Gladstone government in 1885. With the exception of the years 1892 and 1895 Salisbury was at the head of the government from 1886 to 1902. He was regarded as one of the foremost statesmen and diplomats of his time.

SALISHAN STOCK, a group of Indian tribes, classed by language, but whose units possess various dialects. They once occupied prominently nearly all of Vancouver Island, and parts of British Columbia, Northwestern Montana and Northern Idaho. There were about eighty tribes. They number at present about 16,000.

SALI'VA, the transparent watery fluid secreted by glands connected with the mouth. It keeps the mouth moist, and by mixing with the food during mastication makes of it a soft, pulpy mass, that is easily swallowed. It also changes the starchy elements into some kind of sugar. The salivary glands are the *parotid*, on the sides of the throat; the *submaxillary*, under the lower jaw; the *sublingual*, under the tongue, and numerous smaller ones, with separate ducts, which are scattered thickly beneath the mucous membrane of the lips, cheeks, soft palate and root of the tongue. Thorough chewing of the food stimulates the secretion of saliva and helps in the process of digestion (which see).

SALLUST, *sal'ust*, (86-34 B. C.), otherwise CAIUS SALLUSTIUS CRISPUS, was a Roman historian. He became tribune in 52 B. C., and in the civil war was a partisan of Caesar. In 47 B. C. he was made praetor elect, and in the following year accompanied Caesar to the African war, at the conclusion of which he was appointed governor of Numidia. He returned with immense wealth, was accused of maladministration and oppression, but was never brought to trial. In the luxurious retirement of his later years he wrote the *Bellum Catilinarium*, a history of the Catiline conspiracy, and the *Jugurtha*, or *Bellum Jugurthinum*, a history of the war against Jugurtha, king of Numidia, which are valuable rather for literary excellence than historical accuracy.



Leaping a falls

SALMON, *sam'un*, a fish inhabiting salt and fresh waters, and belonging to the same family as the trout and the whitefish. There are about one hundred species, but only five or six are generally known. Salmon inhabit cool water, and are found only in a cool temperate climate. They occur in the largest numbers off the Pacific coast of the United States, British Columbia and Alaska, and in the rivers of these regions. In the northeastern part of the United States, the eastern provin-

ces of Canada and in Norway and Sweden salmon are found which spend their lives in fresh water. These are known as *land-locked* salmon.

Description. The species best known are the quinnat, or king salmon, the blueback, the humpback and the dog salmon. While these species vary in minor points, they all have the same general characteristics. The typical color of the adult fish is a steel blue on the back and head which becomes lighter on the sides and under parts. The king salmon has an average weight of twenty-two pounds, but occasionally one is found weighing 100 pounds. The blueback is of a brighter blue than the king, but not so large, its average weight being about five pounds and its maximum twelve pounds. It may grow to three feet in length, but eighteen or twenty inches is the average size. The flesh of all salmon is of a reddish color, varying from pink to a deep orange. The color varies in the same fish at different times in its life, and the color is no guide to the quality of the flesh, as many suppose.

When it has reached its fifth year, the salmon is mature, and is capable of spawning. Salmon live in the sea until they are ready to spawn, when they ascend rivers to deposit their eggs in fresh water. Sometimes they ascend streams for hundreds of miles, and the strength and skill displayed by them in overcoming obstacles have won the admiration of all observers. Fish have been known to leap fourteen feet into the air and make a curve of twenty feet in

ascending a waterfall. If one fails the first time it continues to repeat the effort until it succeeds or becomes exhausted. Those that fail die in a few days.

The male digs a nest from one to five feet deep in the bed of the stream, and in this the female deposits a countless number of eggs. The spawning over, both male and female float down stream, tail first, making no effort to swim, and within ten days they die.

When the young appear they are about an inch long and have a yolk sac attached to the under side. This furnishes all the nourishment for the young fish for the first two months. The young salmon live in fresh water for the first two years. When they move to the sea they are from three to four inches in length and weigh but a few ounces. After reaching salt water they grow rapidly.

Fisheries. The salmon is one of the most valuable food fishes in the world, and the salmon fisheries are exceeded in value only by those of the herring and the oyster. The greatest salmon-fishing centers in the world are on the Pacific coast of the United States and in Alaska and British Columbia. The fish are taken when they ascend the rivers, or usually in the spring. Gill nets, seines, traps or pound nets and fish wheels are employed in catching the fish. The fish trap consists of a series of nets so laid and fastened to stakes driven in the bottom of the stream as to form a winding passage leading to an inclosure from which the fish cannot escape when they have once entered it. Fish wheels resemble the revolving swing, with wire dip nets in place of the seats. The wheel is mounted on a horizontal axis and is so placed that the current keeps it in constant rotation. The nets pick up any fish that comes within their reach, and dump them into a chute down which they slide to a receiving bin. These wheels range from nine to thirty feet in diameter and from five to fifteen feet in width, and cost from \$1,500 to \$8,000. They are used extensively on the Columbia River. Some of them are attached to scows so they can be moved from place to place. In most of the Alaskan fisheries the trap or pound net is employed.

The fish are cleaned, dressed, cut into pieces and placed in cans, where they are thoroughly cooked by steam before the cans are sealed. In the small fisheries this work is done by hand labor, but in the large estab-

lishments it is all done by machinery. The quinnat, or king salmon, having an average weight of twenty-two pounds, is the species most extensively taken in Alaskan waters, Puget Sound and the Columbia. The blue-back is also extensively taken in the same waters. The pack of Alaska salmon in average years is about 5,000,000 cases, valued at \$23,000,000 to \$25,000,000.

SALOL, *sal'ole*, a compound of phenol and salicylic acid. It is a white powder, odorless and almost tasteless, and soluble in alcohol or ether, but not in water. It is used as a remedy for cholera and jaundice, and a component part of phenacetin, which is employed to relieve the pain of neuralgia and rheumatism.

SALOME, *sal'o'me*, the daughter of Herodias, who caused the death of John the Baptist. The name also is borne by the mother of the apostles James and John and one of Christ's most devout female adherents, who followed him from Galilee in order to minister to him.

SALON, *sa lawN'*, THE PARIS, an exhibition of works of living artists held annually in May and June at the two Palaces of the Fine Arts, when the coveted prize of Rome is awarded. Artists from all over the world may send their productions to the jury of experts, which decides on the works to be exhibited as well as upon the prizes and medals to be given. The National Society of Fine Arts, an independent organization, known as the New Salon, holds its annual exhibitions from May to July.

SALONIKI, *sah lo ne'ke*, GREECE, an important seaport, formerly in European Turkey, situated at the head of the Gulf of Saloniki, 315 miles nearly west of Constantinople and 250 miles north of Athens. As a result of the Balkan War Saloniki was incorporated into Greece. The city rises from the sea in the form of an amphitheater, and when seen at a distance presents an unusually striking appearance. It contains numerous ruins of ancient and medieval times, among which is a triumphal arch to Constantine. There are also a number of mosques of some interest, that of Saint Sophia being noted for its fine mosaics. The city was occupied by the allies October 6, 1915, and became an important post in the Balkan campaign (see **WORLD WAR**). In 1917 the city suffered from a disastrous fire. Population, 1920, about 170,000.

SAL/SIFY. See OYSTER PLANT.

SALT. From the earliest ages salt has been used as a seasoner and preserver of foods, and has borne an important part in the lives of nations. Salt has always been regarded as a symbol of purity and stability. The Israelites were commanded to season their meat offerings to Jehovah with salt, and Jesus called his followers "the salt of the earth." Among certain tribes in the interior of Africa where salt is scarce it is used for money.

The "covenant of salt" could not be broken (*Num.* XVIII, 19). Among Orientals salt is regarded as a symbol of friendship and hospitality. The Arabs have several phrases signifying this meaning. "There is salt between us," signifies friendship; to "eat of a man's salt" is to partake of his hospitality; "to sit above the salt" is to occupy a place of distinction. In Persia the expression "untrue to salt" means disloyalty.

Chemically salt is a compound of chlorine and sodium, and its chemical name is *chloride of sodium*; in mineralogy it is known as *halite*. A certain amount of it is necessary to the life and health of man and of animals.

Where Salt is Found. Salt is found in many parts of the world in one of three forms: in ocean or lake water, in underground brine, and as rock salt. Since all rivers carry some salt the accumulation may become very great when the rivers enter a reservoir which has no outlet. It is in this way that the salt lakes have been formed, and the salt of the ocean has also probably come from the wash of the lands. We must remember that salt is really a mineral, found in the earth; its existence in water is due to solution. In the Caspian Sea the water has only 0.63% salt; the Mediterranean contains 3.37%; the Atlantic Ocean averages 3.63%; the Dead Sea has 22.30 per cent, and Great Salt Lake 23 per cent.

Rock Salt. When the quantity of water evaporated exceeds that entering a natural reservoir, the water becomes saturated, and salt will gradually be deposited on the bottom. The drying-up of lakes or the evaporation of sea water in enclosed bays has thus led to the formation of rock salt deposits. It is from rock salt that most of the world's supply of salt is obtained. Extensive deposits occur in Michigan, New York, Ohio, Kansas, California and Louisiana, and in the province of Ontario, Canada. The deposit on

Avery's Island, near New Iberia, La., covers 144 acres and is of a remarkable degree of purity. Along the Virgin River in Nevada is a bluff twenty-five miles long, over sixty



Figures Represent Millions of Barrels

PRODUCTION IN AVERAGE YEARS

Only those states are named which report over 3,000,000 barrels of salt in a year.

per cent of which is salt of high grade. Extensive deposits occur in the Carpathian Mountains, and some mines there have been worked since the twelfth century. The most celebrated salt mines in the world are at Wieliczka, near Cracow, where streets and houses for the miners have been excavated from the salt. Some of these mines extend over thirty miles, and are a series of vaulted chambers supported on huge pillars of salt.

How Salt is Obtained. The simplest method of obtaining salt is by the evaporation of sea water, but this is seldom done except in countries which have no other source of supply. It consists in conducting sea water into shallow tanks and then evaporating the water by artificial heat or by the sun's rays. Underground brines are extracted by driving wells through which they are pumped to the surface. Rock salt is mined just like any other mineral. When brought to the surface it is either shipped in large lumps or put through a "breaker," or series of crushers, toothed rolls and screens, for breaking up the lumps.

It sometimes happens that rock salt is in such a geological formation that the ordinary mining methods will not do. In this case a well is bored down to the salt deposit in the same manner as an oil well. It is customary to case the well with a pipe; inside of this is put a second tubing, which usually extends to a lower depth than the outer pipe. Water is forced down between the outer and inner tubing. The water at the bottom dissolves the salt, and the solution is forced up through the inner tube. It is also possible to bore several wells, the water being forced down one and the brine up the other. The coarser grades of salt are produced by allowing the water to

Outline on Salt

I. SOURCES

- (1) Salt water
- (2) Brine springs
- (3) Rock salt

II. PRODUCTION

- (1) Methods
 - (a) Evaporation of sea water
 - (b) Boring wells
 - (c) Mining
- (2) Chief producers

III. USES

- (1) Seasoning and preserving
- (2) For chemicals
 - (a) Soda
 - (b) Chlorine
- (3) Miscellaneous
 - (a) Glazing pottery
 - (b) Hardening soap
 - (c) Making glass clearer
 - (d) Fertilizer

IV. INTERESTING FACTS

- (1) References to salt in the Bible
- (2) Meaning among orientals
- (3) Arab phrases
- (4) The Persians' method of expressing disloyalty
- (5) Use of salt for money

Questions on Salt

What is salt?

What process causes the formation of salt deposits?

Where is most of the salt extracted from sea water produced? What is it generally called?

What are the processes of drying? By which process is the best salt produced?

Where in the United States is rock salt found? Where underground springs or wells?

For what has salt been used since the earliest times?

What are some other uses for salt?

Is salt unknown anywhere in the world?

Why are some people called "the salt of the earth"?

How does salt preserve meat and fish?

Where in the United States have large salt works been recently established?

evaporate by the sun's heat, but for the better grades artificial heat at a very high temperature is necessary. A tank is about twenty to twenty-four feet wide, one hundred feet long, and ten to twelve inches deep. The tanks rest on brick arches and the heat is supplied from grates set at one end of the tank and somewhat underneath it. Instead of using grates, hot water or steam pipes are often run under the tank. In another process the brine is poured into large kettles having a capacity of 120 gallons.

In the United States salt is found at various depths. In New York it is mined from beds of rock salt which reach a thickness of 250 feet; the beds outcrop in the central portion of the state and dip southward to a depth of 2,700 feet. In Michigan the beds lie at a depth from 1,600 to 2,200 feet. In Kansas the salt is nearer the surface, seldom being found below 800 feet. Great Salt Lake (which see) has become one of the important sources of salt, and the salt works erected there are among the largest in the world. The output is over 50,000 tons a year.

Michigan and New York are the most important salt states. Ohio and Kansas are next in order.

Uses. There are various grades of salt, each designed for a special purpose. We have table, dairy, common, fine, packers', solar and other grades. The chief use of salt is for preserving and seasoning food, especially in packing meats and fish. It is extensively used in the arts in the manufacture of soda ash and carbonate of soda, for hardening soap, for glazing the coarser grades of pottery, such as jugs and crocks, and for improving the clearness of glass. It is also a source of chlorine, and on some soils it is a valuable fertilizer.

SALTILLO, *sahl teel'yo*, MEXICO, known locally as LEONA VICARIO, in the northeastern part of the country, the capital of the state of Coahuila, about fifty miles southwest of Monterey. Near the town is the site of the Battle of Buena Vista, a leading engagement of Taylor's campaign in the Mexican War. Saltillo is served by the National Railway of Mexico, and in normal times is a prosperous manufacturing city, producing cotton, woolen and knit goods. There is a college, the Madero Institute, a library and several Roman Catholic churches. Population, 1915, about 38,000.



SALT LAKE CITY, UTAH, the capital and largest city of the state and the county seat of Salt Lake County, situated twelve miles southeast of Great Salt Lake and 742 miles west of Denver, on the Denver & Rio Grande, the Oregon Short Line, the Western Pacific and the Salt Lake & Los Angeles railroads. The site is a gently undulating plateau, at the foot of the Wasatch Mountains, with

an altitude of 4,300 feet above sea level. The city is regularly laid out, with wide, straight streets, and the residential sections are beautified by shade trees, broad lawns and flower gardens about the homes.

Features of Special Interest. The city centers about Mormon Square, or the Temple Block, which covers an area of about ten acres and is the site of the Tabernacle, the Mormon Temple and the Assembly Hall. The Tabernacle is an oval auditorium, 250 feet long, 150 feet wide and 70 feet high, with a seating capacity of nearly 10,000. The roof is supported by arches, and the acoustic properties of the auditorium are such that a person speaking in an ordinary tone of voice can be distinctly heard in any part of the room. At one end are the choir loft and the great organ, considered by many the best instrument of its kind in the United States. The Temple is the most prominent structure in the city. It was nearly forty years in process of erection and cost over \$4,000,000. It is of Utah granite, and in its finishings and furnishings the interior is said to be richer than the famous Temple of Solomon. The building is 186 feet long and 99 feet wide, and each end is surmounted by three lofty towers. The highest spire supports a figure of the Mormon angel Moroni. Since its dedication the Temple has been closed to all except Mormons who have lived according to the rules of the Church. It is used for marriages, baptisms and other sacred rites.

In front of the square containing these buildings is a low monument, surmounted by a statue of Brigham Young. The city has thirteen parks and playgrounds, including Nibley Park, in which there is a municipal golf course. Chief among the public build-

ings are the county and city building, the new \$2,000,000 state capitol, the Salt Lake Theater, the state penitentiary and a number of business blocks. The educational institutions include the University of Utah, a state normal school, Westminster College, Rowland Hall, the Latter Day Saints' College, and schools maintained by the Congregational, Protestant Episcopal and Presbyterian denominations.

Industry. Salt Lake City is in the center of a rich mining region and has a number of large smelters. The other industrial establishments of importance include car shops, boot and shoe factories, foundries and machine shops and lime and cement works. The city is an important distributing point for the surrounding country and has an extensive trade.

History. Salt Lake City was founded in 1847 by a company of Mormons under the leadership of Brigham Young (see **MORMONS**). It was organized as a city in 1851 and was given its present name in 1868. After the discovery of gold and silver in the vicinity, Gentiles (those not belonging to the Mormon faith) began to settle in the city, and now only about two-thirds of the population are Mormons. From the beginning the city has had a steady and prosperous growth. Population, 1910, 92,777; in 1920, 118,110; 1923, (U. S. Est.) 124,000.

SALTON SEA, *saw'l-ton*, or **SALTON SINK**, a large body of water occupying a portion of Imperial Valley in Southern California. The valley is the basin of an old inlet from the Gulf of California, and is from 200 to 300 feet below sea level. It is supposed to have been shut off from the gulf by a bar formed of sediment deposited by the Colorado River, whose bed is far above the bottom of the valley. In time the water evaporated and left a large fertile area. This land, however, was useless without water for irrigation. In 1900 a company of American capitalists attempted to supply the valley with water by tapping the Colorado River and constructing a canal. But the slope of the canal was so rapid that the water soon got beyond control, and the Colorado sought the lower level by the shortest course. A lake covering an area of 500 square miles was formed. Millions of dollars worth of property were destroyed, and many people were driven from their homes. By the united efforts of the Southern Pacific Railway and the United States government

the breach in the bank of the river was finally closed. In the course of time the waters may disappear through evaporation.

SALTPETER, or **NITER**, a compound of potassium and nitric acid, known in chemistry as potassium nitrate and bearing a close resemblance to common salt. It is found native in some earths in the cave region of Kentucky and Tennessee, and in certain localities in Spain, Egypt and India, but most of the saltpeter of commerce is prepared by treating potassium chloride with sodium nitrate.

Saltpeter crystallizes in transparent six-sided prisms. It has a mild, salty taste, and when taken in small quantities produces a cooling effect. For this reason it is sometimes given as medicine in fevers. It is a strong preservative, and is sometimes put in brine for preserving meat. Its most extensive use in the arts is in the manufacture of gunpowder; it is also used in making fireworks and matches; it enters into the composition of a number of fluxes for smelting ores, and is employed to some extent in dyeing.

Chile Saltpeter or **Soda Saltpeter**, is a sodium nitrate. It takes its name from the fact that extensive beds of it are found in Chile and Bolivia. It is extensively used as a fertilizer and in the manufacture of saltpeter. See **GUNPOWDER**; **FERTILIZERS**.

SALTS, **SMELLING**, a preparation of carbonate of ammonia with a sweet-scented volatile oil. See **AMMONIA**.

SALUTATION, formal recognition, by words or gestures, between persons upon meeting. Verbal salutations usually express a wish for the welfare of a person or an inquiry as to his health. Salutations by gesture vary with different peoples. In Western countries people shake hands or kiss each other; the Chinaman shakes his own hands; the Tibetan sticks out his tongue and pulls his right ear; the native New Zealanders rub noses. Subservience is indicated by prostrations, kneeling, military salutes, etc.

Salutations according to rank, as "Your Majesty," "Your Grace," "Your Excellency," were formerly very much in use. These still persist even in democracies, in the title "Reverend" given to clergymen and "Your Honor" addressed to judges.

SALVADOR, *sahl va daw'r*, the smallest, most, densely populated and most progressive of the republics of Central America, has an area of 7,225 square miles, making it a little

smaller than the state of New Jersey. The coast line is about 200 miles long and deeply indented, so that it contains a number of good harbors. Along the coast there is a low plain about fifteen miles wide, but the interior of the country is traversed by mountain groups and has a decidedly wild appearance. A number of the peaks are volcanoes, the highest having an altitude of about 8,000 feet. Izalco has been active almost continuously for more than 100 years. The rivers are few, the most important being the Lempe, which rises in Lake Guijar and flows southeast and forms a part of the boundary between Salvador and Honduras.

Climate. The climate along the coast and in the valley is hot and in many places unhealthy, but in the interior, among the hills and mountains, it is equable and healthful. There is an abundant rainfall.

Products and Commerce. The soil is usually fertile and most of the country is in a state of cultivation. The principal crop is coffee, the annual crop of which averages over 80,000,000 pounds, valued at about \$13,000,000. Other important products are cotton, tobacco, sugar cane and rubber. Gold, silver, copper, iron and quicksilver are found, and there are numerous mines in operation. There are no manufactures. A line of railway connects Acajutla, Santa Ana and Libertad, and another connects San Salvador with Santa Ana. Aside from this, inland transportation is by draft or pack animals.

People and Government. Three-fourths of the people are of mixed white and Indian blood, and are called Ladinos, or Mestizos; there are a few whites, and the remainder are Indians. Education is free and compulsory. Elementary schools are found in all parts of the country; there are numerous higher schools and a national university. Most of the inhabitants are members of the Roman Catholic Church but there is freedom in religious belief.

The government is republican in form, the executive consisting of a president and the legislative power being vested in a single chamber. The president is chosen for four years and is assisted by a cabinet of four members. For the purpose of local government the state is divided into fourteen departments. Salvador was formerly a possession of Spain, but it revolted in 1821 and joined the Mexican Confederation. Two years later it withdrew from this confederation and

subsequently formed part of the Republic of Central America. In 1921 it joined the new Central American Federation.

Progress has been delayed by wars with neighboring states and by revolutions and counter revolutions at home. Yet the economic development and stability of Salvador are far in advance of those of the other Central American states. A disastrous earthquake occurred in the spring of 1919, causing great loss of life and property. The capital and chief city is Salvador (which see). The other cities of importance are the seaports of La Libertad and Acajutla. Population, 1922, estimated, 1,500,000. See CENTRAL AMERICA.

SALVATION ARMY, one of the most influential religious bodies in the world. It is organized on a semi-military plan and has for its purpose the bringing of spiritual and material benefit to those whom the Churches do not reach. The organization is the outgrowth of a mission begun in East London by "General" William Booth, in 1864. Booth was a Methodist minister, and finding that the Church did not sympathize with his work among the poor, he began holding independent meetings in an unused graveyard, and organized what was first known as the Christian Mission. The present name was adopted in 1878. With the name *army* came military phraseology. Prayer was called knee-drill; the leader, a general; evangelists, officers and candidates, cadets. A semi-military attire was assumed, and barracks were built. Total abstinence is a condition of membership. The object is to attract people who would not enter church or chapel, and for this cause public houses and prisons are visited, and open air meetings are held. Since its organization the work of the Salvation Army has been expanded to include many kinds of activity, all of which are carried on under two general departments—the evangelistic and the department of social relief. The evangelistic work lies at the foundation of all other activities. In their meetings the Gospel is preached in such simple language than even those unable to read can understand the message, and strong spiritual and moral influences are brought to bear directly upon the individual.

The department of social relief maintains slum settlements, which have been likened to "lighthouses on a dark and rocky coast;" establishes rescue homes for the reclamation of fallen women, and industrial homes where

homeless and otherwise unemployed men are given work until they can find employment. Workmen's hotels, where a poor man may find a clean bed amid wholesome surroundings, are maintained in all large cities, and free employment bureaus find work for those who need it.

Young women's boarding homes do for girls on a moderate salary what the hotels do for the men, and in addition provide home-like surroundings and enjoyable and wholesome entertainment. Other lines of work include homes for the care and training of orphan children, the giving of Christmas dinners to the poor, giving assistance to the families of prisoners and released prisoners, and the maintenance of schools for the training of Army officers and workers.

Organizations of the Salvation Army are found in forty-nine countries, and in 1919 they maintained 9,647 posts and 1,231 social institutions.

Work in the World War. Within ten days of the beginning of hostilities in 1914, the commander of the Salvation Army in England offered the services and resources of the organization to help the soldiers at the front, and a small body of workers was immediately sent to France. This number was gradually increased to a force of over 2,000, thoroughly organized and equipped for service. The American branch moved with equal rapidity. The week that war was declared the forces and resources of the Salvation Army in the United States were offered to the government, and one of its leading officers accompanied the first detachment of troops sent abroad. Others followed at short intervals, until a strong force from the American branch was in the field.

Because of their military organization and discipline, the members of the Salvation Army could more easily adapt themselves to army requirements and conditions than could the members of most other auxiliary organizations. They wasted no time on non-essentials, but seized upon every condition and circumstance possible that would enable them to carry comfort, cheer and any form of assistance to the soldiers at the front. The Salvation "lassies" were the only women admitted to the trenches, and there many of them shared the hardships and dangers of the men, serving coffee and food and caring for the wounded. In addition to this they remained for hours at a time under fire, dress-

ing the wounds of those who were injured. They established huts for social and religious gatherings and for dispensing refreshments, and maintained an ambulance and hospital service. Soldiers give praise without limit to the heroic men and women who rose to their great opportunity in the time of the world's greatest need. See **BOOTH** (family).

SALVINI, *Sahlv'è-ne*, **TOMMASO** (1829-1916), a famous Italian tragedian, was born at Milan. His parents were actors, and at fourteen the boy began a stage career. In four years he was playing leading rôles with Ristori. In 1849 he entered the army to fight for Italian independence, and rendered conspicuous service. After the war he returned to the stage and won praise for his performances of great classic rôles. In 1868 he organized a company with which he made many tours of Europe and America. He never learned English, but spoke his parts in Italian, even when the rest of the play was spoken in English before English audiences, yet he retained his popularity. He retired in 1890 to his home at Florence.

SAMARIA, a city of Palestine and the capital of the northern kingdom of Israel. It was built by Omri and named for Shemer, the original owner of the site (*I Kings*, XVI, 24), and was captured by the Assyrians about 722 B. C. In the second century B. C. it was entirely destroyed, but it was rebuilt by Herod the Great, who named it Sebaste. The small village of Sebastiyeh now occupies a part of the site.

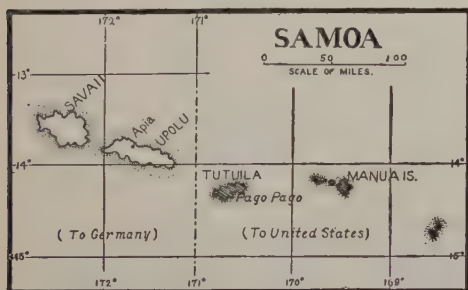
SAMARITANS, the name applied to the inhabitants of the region between Judea and Galilee in Palestine. They were a mixed people consisting of remnants of the tribes of Manasseh and Ephraim and Assyrian colonists who were brought by the king of Assyria to take the place of departed Jews after the fall of the northern kingdom. The Samaritans were strict adherents of the law of Moses, but they were regarded by the Jews as heretics, because they did not accept other parts of the Old Testament.

When the Jews returned to Jerusalem from the captivity the Samaritans wanted to assist in rebuilding the Temple, but the Jews rejected their offer with scorn. The Samaritans built a temple on Mount Gerizim, and during the time of Christ the Jews and Samaritans had no dealings with each other. During the subsequent rule of the Romans over Palestine the Samaritans were scattered.

SAMARKAND, *sam ar kant'*, RUSSIAN TURKESTAN, is situated on the Transcasian Railway, 140 miles east of Bokhara. The city is divided into the native, or old, quarters and the Russian, or modern, quarters. In the native quarters is a large central square. This part of the city has narrow streets and contains a number of mosques and bazaars. The Russian quarter dates from 1871 and is constructed on a more modern plan. The city contains the tomb of Tamerlane, who formerly ruled a vast empire of which Samarkand was the center. Samarkand has a good trade in cotton, rice, silk, gold and silver wares, pottery and wines. Population, 1910, about 90,000.

SAMNITES, several ancient tribes of Lower Italy, of Sabine stock. They were a brave, frugal and religious people, who were brought under complete subjugation by the Romans after wars waged with few interruptions for fifty-three years. When the Italian allies of Rome revolted in 900 B. C., the Samnites again fought desperately against their oppressors, but were entirely subdued by Sulla, and the tribes were almost exterminated.

SAMO'A or **SAMOAN ISLANDS**, formerly called **NAVIGATOR'S ISLANDS**, a group of islands in the Pacific Ocean, situated between $13^{\circ} 25'$ and $14^{\circ} 30'$ south latitude and between 168° and 173° west longitude. They are



4,300 miles southwest of San Francisco and 2,400 miles northeast of Sydney, Australia. The islands are fourteen in number, and are of volcanic origin. Their total area is about 1,100 square miles, and their population is about 39,000. The islands are decidedly mountainous and contain volcanic cones which rise to over 5,500 feet. The vegetation is of a tropical nature and is luxuriant. The climate, though hot, is healthful, but the islands are subject to violent hurricanes. One of the most disastrous, in 1889, caused widespread destruction of property and life.

Before the World War these islands were under the control of Germany and the United States, but in 1914 a British force from New



Zealand occupied Apia, on the German island of Upolu, and within a short time New Zealand extended its control over all of German Samoa. The only islands of importance are Savaii, 660 square miles in area, Upolu, 340 square miles, and Tutuila with seventy-seven square miles and a population of 7,250. Tutuila is under the administration of the United States, which maintains a garrison at Pago Pago, the only good harbor in the islands. Savaii was German territory at the outbreak of the war. Robert Louis Stevenson lived on Upolu for years, and his grave is on a hillside overlooking Apia. The natives are the best type of the Malay race, and are industrious, kind and hospitable.

SAMOS, *sa'mahs*, one of the principal islands of the Aegean Sea, separated from Asia Minor by a narrow strait. The area is about 289 square miles and its population, almost entirely Greek, is 65,000. It is traversed by a mountain range. Its fertile lowlands yield an abundance of raisins, fruits, mastic, corn, oil and Muscadine wine. The island also contains valuable marble quarries. It was a possession of Turkey before the World War.

SAMOTHRACE, **VICTORY OF**. See sub-head, under **SCULPTURE**.

SAMP'SON, **WILLIAM THOMAS** (1840-1902), an American naval officer, born at Palmyra, N. Y. At the age of seventeen he was appointed a midshipman in the United States Naval Academy at Annapolis, graduated at the head of his class in 1861 and was immediately ushered into service. In 1866 he was promoted to be lieutenant-commander, while on the *Colorado*. From 1868 to 1871 he was instructor at the Naval Academy, and again from 1876 to 1879; and from 1886 to 1890 he was its superintendent. From 1893 to 1897 he was chief of the bureau of ord-

nance, and had much to do with the building up of the navy.

Sampson was president of the court of inquiry to investigate the destruction of the Maine, and at the outbreak of the Spanish - American War was made acting rear-admiral and given command of the fleet off the coast of Cuba. He planned the blockade of Santiago harbor, but while he was away conferring with General Shafter in command of the land forces, the Spanish fleet attempted to escape. It was attacked and destroyed by the American fleet under the command of Commodore Winfield Scott Schley.

After the war Sampson was raised to the rank of rear-admiral, and given charge of the Charlestown Navy Yard. He retired in 1902 and died soon after. See SCHLEY, WINFIELD SCOTT.



WILLIAM THOMAS
SAMPSON

SAMSON, "the Jewish Hercules," was a judge in Israel, and was famed for his great strength. His story is told in the book of *Judges*, chapters XIII to XVII. Before his birth his mother was commanded by an angel to bring him up as a Nazarite. That meant he was not to drink wine or cut his hair. He was a popular hero and an inveterate enemy of the Philistines. His peculiar gift of great bodily strength is strikingly shown in the nature of his deeds; he tore in pieces a lion; broke his bonds asunder and carried away the gates of Gaza, and slew a thousand Philistines with the jawbone of an ass. A Philistine woman, Delilah, with whom he fell in love, coaxed from him the secret that the source of his great strength was his long hair, and when he was asleep she cut his hair, and deprived him of his strength. He was then captured by the Philistines, who put out his eyes and cast him into prison. Later, at the great feast of Dagon, Samson was taken from prison to amuse the Philistines, but his hair had grown and his strength had returned, and he pulled down the building over the Philistines and perished with them. Milton made his death the subject of the drama *Samson Agonistes*. The opera *Sam-*

son and Delilah, by Saint-Saëns, is also based upon incidents in his life.

SAMUEL, the first of the order of prophets after Moses and the last of the judges of Israel. He was consecrated by his mother, Hannah, to the service of Jehovah, and was brought up in the Temple under the direction of Eli, the high priest. He assumed the judgeship about twenty years after the death of Eli. His administration was distinguished by the restoration of the worship of Jehovah, the defeat of the Philistines and the induction into office of Saul, the first king of Israel, whom God directed Samuel to anoint. When Saul failed in his duties, God directed Samuel to anoint David. Samuel did not live to see the end of the contest between Saul and David. See BIBLE, subhead *Bible Stories*.

Samuel, Books of, two books of the Old Testament immediately following *Judges*. They contain the history of Israel during the administration of Samuel and the reigns of Saul and David. The books were originally one, and were named for Samuel because of the prominent part he took in the history of the period. The author is unknown.

SAMURAI, *sak moori*, a Japanese word meaning *guard*, defines a military caste in Japan during the feudal régime. It included the shogun, or commander in chief, the daimios, or feudal landowners, and the followers or retainers of the latter, besides a part of the middle class. When the feudal system was overthrown in 1871, the daimios and their followers were given pensions, in return for the cession of their lands to the emperor, and the daimios were thereafter known as *nobility*, while all the members of the samurai were given the title of *gentry*.

SAN ANGELO, TEX., the county seat of Tom Green County, situated on the unnavigable Concho River, and on the Gulf, Colorado & Santa Fé and the Kansas City, Midland & Orient railroads. The city is an important shipping point for cattle and produce. It has machine shops, railroad repair shops, an oil mill, cotton gins, lumber yards and other industries. A motorized fire department is maintained. The commission form of government was adopted in 1915. Population, 1910, 10,321; in 1920, was 10,050 (Federal census).

SAN ANTONIO, TEX., the second largest city of Texas, only a little smaller than Dallas. It is the county seat of Bexar

County, eighty miles southwest of Austin, on the San Antonio River and on the Southern Pacific, the International & Great Northern, the Missouri, Kansas & Texas, the San Antonio & Aransas Pass, the Southern Pacific, the Gulf Shore, and the San Antonio, Uvalde & Gulf railroads. The city has an altitude of about 650 feet and has a dry, healthful climate. There are, in all, about twenty parks and plazas. Near the city is Fort Sam Houston, covering about 250 acres, which is one of the largest army posts in the United States and is the headquarters of the Department of Texas. San Antonio is a popular resort for tourists and health seekers, especially for those afflicted with pulmonary diseases.

The educational institutions consist of a large Carnegie Library, nearly fifty private schools and colleges, including the Saint Louis College, Santa Anna Female College, Thomas School, Peacock's School for Boys, Saint Mary's Hall, West Texas Military Academy and Mrs. Mulholland's School for Girls. Among the charitable institutions are the Santa Rosa Hospital, Physicians' and Surgeons' Hospital and the Southwestern Insane Asylum. Other prominent buildings are a courthouse, a city hall, a Federal building, a market house, Convention Hall, San Fernando Cathedral, Saint Mark's Cathedral, two hotels costing nearly \$1,000,000 each, several metropolitan office buildings and those occupied by about twenty banks. There is a valuable trade in cotton and live stock. The industrial establishment, over 350 in number, include machine shops, foundries, flour mills, cement works, binderies, cotton presses and other works.

San Antonio was probably first settled in the latter part of the seventeenth century. In 1718 the missions of San Antonio de Valero and of San Antonio de Bexar were founded. In 1731 a colony of people arrived from the Canary Islands. The place was then known as the Villa of San Fernando de Bexar, and this villa was made a city in 1809. The Texan patriot army occupied the place in December, 1835. On the sixth of the next March the famous storming of the Alamo occurred, when the entire garrison were massacred and their bodies burned by the Mexican dictator, Santa Anna. After the decisive victory for the Texans in the Battle of San Jacinto, American pioneers came in greater numbers, and they were followed the next decade by Germans. The first railroad reached the city

in 1878, and since then its growth has been rapid. The commission form of government was adopted in 1913. Population, 1910, 96,614; in 1920, 161,308.

SAN BERNARDINO, *ber nahr de'no*, CALIF., the county seat of San Bernardino County, situated in a beautiful valley of the San Bernardino Mountains, sixty miles east of Los Angeles, on the Southern Pacific, the Santa Fé, the Los Angeles & Salt Lake and several lines of electric railways. The abundant tropical vegetation of the valley is in marked contrast to the barren desert which surrounds it. San Bernardino is in the orange belt of California, locally called the "Orange Empire," and packing, preserving and shipping fruit are among its important industries. The Orange Fair, held here annually, has attained a national reputation. The city contains hot water, sulphur and mud baths, has an equable climate and is a popular health resort. A state hospital for the insane is located here, and the city has the Saint Bernardine of Sienna Academy and a business college. The important public buildings are the courthouse, the hall of records, seven churches, the hotels and several banks. The industrial establishments are railroad shops, lumber mills, grain elevators, machine shops and other factories. The place was settled by a company of Mormons in 1851. Population in 1910, 12,779; in 1920, 18,721, a gain of 47 per cent.

SAND, fine particles of quartz and feldspar loosely mixed together. Most sand has been formed by the wearing away of rock, especially sandstone, and sand is being made wherever the wind and waves beat upon any rock containing quartz and feldspar. Pure quartz sands are very valuable for the manufacture of glass, for making mortar, for use as filters, for lightening dense clay soils, for making molds in founding and for many other purposes. Some sands contain metals, and such valuable ores as gold, platinum, tin, copper, iron and titanium often occur in sand. There are many miles of sand along the sea shore and in some inland localities, such as Dune Park, Indiana, along Lake Michigan, it is piled into hills resembling small mountains. See SANDSTONE.

SAND, GEORGE (1804-1876), the pen name of a celebrated French novelist and playwright, ARMANTINE LUCILE AURORE DUPIN, Baroness Dudevant. She was born in Paris. Her first literary venture was a novel, written

in conjunction with a young lawyer, Jules Sandeau, and published under the pseudonym "Jules Sand." From this she took her own pen name. Her published works comprise over sixty novels, numerous plays and several volumes of memoirs. George Sand embraced radical views on social questions and flitted with surprising quickness from one love affair to another. Among her novels may be mentioned *Consuelo*, *Monsieur Sylvestre*, *The Snow Man*, *The Marquis of Villemer* and *Flamarade*.

SANDALWOOD, a fragrant wood of several species of trees native to the East Indies and the Malayan and Polynesian islands. Its wood is manufactured into glove boxes and other articles of ornamental nature. It is largely used as incense in worship by Brahmans and Buddhists. There are several species which furnish sandalwood, the common being the white sandalwood, which comes from the mountains in south India and the islands of the Indian Ocean. Sandalwood oil, after distillation, is used in perfume and for medicinal purposes. Sandalwood chests repel insects.

SAND BUR, or **BUR GRASS**, a prickly weed found in sandy regions in all countries. The stems are from one to two feet long, and bear spikes of ten to twenty burs, which cause painful wounds when imbedded in the flesh. The sand bur is particularly injurious to sheep, since so many burs may become entangled in the wool that the fleece cannot be used. If they reach the skin they cause wounds that affect the health of the animal.

SAND EEL, or **SAND LANCE**, a group of fishes characterized by long, slender cylindrical bodies resembling that of an eel. They vary from four inches to a foot in length, are of a beautiful silvery luster, are destitute of ventral fins, and their scales are so small that they can scarcely be seen. Sand eels swim in schools near the shore and bury themselves in the sand. They are found along the coast of North America from Labrador to New York, and are largely used as bait for cod.

SAND'ERLING, a bird resembling the common sandpiper, but differing from it in that it lacks the hind toe. It breeds in the Arctic regions of both hemispheres and migrates to the southern sections of South America and Africa, but many winter in the Southern states. The feathers of the head and neck are gray, edged with lighter color and

spotted with brown, and the lower parts are white. These birds are found along the seacoast, especially during the migrating season, running in the surf.

SAN DIEGO, *sahn de a'go*, CALIF., the county seat of San Diego County, is situated on San Diego Bay, the only land-locked harbor between Panama and San Francisco, 125 miles southeast of Los Angeles and on the Santa Fé and the San Diego & Arizona railways. Its excellent harbor makes San Diego the home port of a number of steamship lines operating between the Pacific coast of the United States and foreign countries. The city is beautifully located on ground sloping towards the bay, and is modern in every respect. The streets are broad, and are ornamented with shade trees, and there are several parks, among them the Plaza, in the center of the business part of the city, and Balboa Park, containing 1,400 acres, where the Panama-California Exposition was held in 1915 and 1916. The permanent buildings erected for this exposition add much to the beauty of the park and of the city.

Among the important buildings are a Federal building, a courthouse, many modern hotels, a senior high school and five junior high schools, a State Teachers' College, a Carnegie Library, a Masonic Temple and scores of churches. The city also contains the San Diego Army and Navy Academy, the Universal Brotherhood and Theosophical Society, a great U. S. Army Aviation station, Marine Corps base, Naval Training Station, Fleet Repair base, and a number of private schools. Hotel del Coronado, on a neck of land protecting the harbor, with its Japanese gardens and Tent City, is a widely-known winter resort.

The city has a large export and import trade. The leading industries are connected with marketing citrus fruits, the manufacture of fruit and meat products and canning sardines and tuna fish.

The first mission founded in California by the Franciscan Fathers was established at San Diego in 1769, and the Spanish town was organized in 1835. The place was taken by Commodore Stockton in the name of the United States in 1846. The present city has grown chiefly since 1900. Population in 1910, 39,578; in 1920, 74,683; 1924, 125,000.

SAND'PAPER, a material for smoothing and polishing, made of a stout paper coated with sharp sand embedded in glue. It is

intermediate between glass paper and emery paper in its action on metals, and is less effective than glass paper on wood. Steel wool is now largely used as a substitute for sandpaper.

SANDPIPER, a small snipe, of which there are about thirty species, found in all parts of the world. They live on the shores of the sea and on the banks of rivers, and seek their food by thrusting their long bills into the soft mud for worms and small mollusks. In winter they migrate to the South in flocks, changing their plumage with the change of seasons. The voice of sandpipers is shrill, but cheery. The eggs, usually three or four, are drab, olive, or buff, heavily spotted with dark brown. The *pectoral sandpiper*, called also the *jacksnipe*; the *purple sandpiper*, and the *spotted sandpiper*, or *teetertail*, are the most common of the species of the United States.

SANDSTONE, a rock composed of grains of sand, cemented together by some other mineral. The cementing mineral may be limestone, clay, oxide of iron or silica. Sandstone is abundant in many localities. It is found in the valley of the Connecticut River, in northern New York, in sections of Ohio, Michigan and Iowa and in many other places. It varies in color from light gray and bluish-gray to dark brown. That found near Cleveland, Ohio, is gray; that near Potsdam, N. Y., a dark red. Sandstone is used for a variety of purposes. Certain fine-grained sandstone makes excellent grindstones and whetstones. Some varieties are soft when quarried, but harden on exposure to the air. The rock is easily quarried and worked, and forms one of the most valuable building stones. The famous "brown stone fronts," formerly so fashionable in large cities, were of sandstone.

SANDUSKY, OHIO, the county seat of Erie County, fifty-five miles west of Cleveland, on Lake Erie, at the mouth of the Sandusky River, and on the New York Central, the Pennsylvania, the Baltimore & Ohio, the Cleveland, Cincinnati, Chicago & Saint Louis and the Lake Erie & Western railroads. There are also electric railways to Cleveland and other places. The city has an excellent harbor and a considerable trade with other lake ports. The surrounding region is fertile and produces fruits, vegetables and grain. Grapes are extensively cultivated, and fishing is also an important industry. The principal manu-

factories are basket and crate works, strawboard, crayons, iron and steel products, cooper shops, wagon and carriage factories, ship-building yards, machine shops and flour mills. There are also large coal and lumber yards. The state soldiers' and sailors' home is located here. Some of the prominent structures are a Federal building, a courthouse, a county infirmary, a jail, a Carnegie library and two hospitals. Cedar Point and Put-in-Bay, a few miles into Lake Erie, are popular summer resorts. Sandusky was settled in 1817, and was incorporated as a city in 1845. The commission form of government was adopted in 1915. Population, 1910, 19,989; in 1920, 22,897, a gain of 15 per cent.

SANDY HOOK, a narrow peninsula, which projects northward from the coast of New Jersey and partly encloses New York Bay. It is about six miles long and is low and sandy. Near its northern end are the United States military post Fort Hancock and a lighthouse.



SAN FRANCISCO, *san fran sis'ko*, CALIF., the chief seaport of the Pacific coast, is situated on the peninsula between San Francisco Bay and the Pacific Ocean, which extends to the Golden Gate, on the north. The city's area is 42 square miles and comprises the County of San Francisco. It is laid out on hills, which are separated by

nearly parallel valleys, and presents a most picturesque appearance, whether seen from the ocean or the bay. It has broad streets and boulevards and many beautiful trees. The residence section is filled with fine mansions, especially along the high ridge, which is parallel to the bay, extending toward the Golden Gate. Along the ocean is a high ridge of sand dunes, which serve to protect the city from the winds.

Plan of the City. Market Street, the principal thoroughfare, extends from the Ferry Building southwest to the vicinity of Twin Peaks, and divides the city into two nearly equal divisions. South of Market Street is the older part of the city, frequently known as the *Mission*, because a Spanish mission was founded in the locality. The two districts are usually known as *North of Market Street*

and *South of Market Street*. The north district contains the chief residence portion and the retail stores of the higher class, while the wholesale houses and manufactories are in the south district. North of Market Street the streets run north and south and east and west, but south of it they run diagonally.

Nearly all lines of business and transportation radiate from the Ferry Building, on the water front. This is a commodious structure 650 feet long, with a large tower rising from the center. All ferries from across the bay land here, and there are over 170 arrivals and departures of ferry boats every twenty-four hours. The California Development Board and the State Mining Bureau have their headquarters here, and the second floor contains an extensive exhibit of the agricultural and mineral resources of the state. North and south of the Ferry Building are extensive docks, at which may be found ships from all parts of the world.

Street cars run from the Ferry Building to all parts of the city. The retail district is on Market Street and adjoining portions of Geary, Kearny, Post and Sutter streets. At the intersection of Geary, Kearny and Market streets is the chief business center; Lotta's Fountain ornaments the small square formed by the intersection of these streets. Surrounding this square and within a short distance from it are many of the large buildings, including the United States Subtreasury, San Francisco Stock Exchange and the building of the Standard Oil Company. In Union Square, two blocks west, is a monument to Admiral Dewey. Other buildings of importance include the Federal Building, a granite structure which survived the fire; the Hobart Building, on Market Street; the Pacific Building, near the ferry; the Humboldt Savings Bank Building; the Mutual Savings Bank Building; the Merchants' Exchange, and the Chronicle and Hearst buildings. Among the most noted structures of the city are its three great hotels—the Palace, on Market Street; the Saint Francis, facing Union Square, and the Fairmont, overlooking the city from Nob Hill. The Civic Center, beginning at the intersection of Market Street and Van Ness Avenue, is surrounded by a group of magnificent public buildings—the city hall, the municipal auditorium, California State building and public library.

Chinatown. Within the heart of San Francisco, occupying ten city blocks, is a for-

eign city, Chinatown, in which no whites dwell. Although the old Chinatown was destroyed in the fire of 1906, and was rebuilt on a modern plan, "the Chinaman has not changed many of his spots," and here may be seen the customs, rites and daily life of the Chinese very much as it is lived in China.

Parks and Boulevards. "Undoubtedly, the chief glory of the city is its Golden Gate Park," writes one of San Francisco's most enthusiastic admirers. This park is a half mile wide, and extends inland for four miles, having an area of 1,013 acres. It is one of the largest city parks in the country. It contains many beautiful drives and walks, winding among shady trees, flowers, streams and quiet pools. Numerous tennis courts, baseball diamonds and a stadium provide opportunity for athletic sports, and in the De Young Memorial Museum and art gallery are valuable collections of antiques, paintings and statuary. Lincoln Park, in the northwest part of the city, is on elevated ground, and affords a fine view of the entrance to the harbor. The Presidio, a military reserve and training ground, joins it on the east, and east of the Presidio is Fort Mason.

The city is favored by having an extensive beach on the ocean front, and this is much used for bathing. At the north end of the beach stands the Cliff House, built on a projecting ledge of rocks and near the Seal Rocks, frequented by sea lions. The Beach Boulevard, beginning at the Cliff House and extending southward for miles, is one of the chief highways of the city. On a hill overlooking the Cliff House are the Sutro museum and gardens, noted for their baths and statuary.

Education. The public high schools are accredited by the University of California and the Leland Stanford Jr. University. The other leading educational institutions include the Normal School, Cogswell Polytechnic College, St. Ignatius College, Wilmerding School of Industrial Arts, the California School of Mechanical Arts, the Lux School of Industrial Training for Girls, and the Conservatory of Music.

Commerce and Industry. San Francisco is the principal seaport of the Pacific coast. Its harbor is one of the best in the world, and throughout the year it contains ships of all nations. The annual foreign trade exceeds \$325,000,000 in value. Transcontinental railway lines, which terminate at Oakland, Al-

ameda and Richmond and are connected with the city by ferry, also afford ample railway facilities for inland transportation. The city contains a large number of wholesale and commission houses.

The city is one of the largest manufacturing centers of the country. Among the leading industries are sugar refining, meat packing, canning and preserving fruit, and the manufacture of machinery, glass and chocolate. San Francisco has one of the largest dry docks in the country, and several large ship-yards in and near the city give employment to thousands of men.

History. San Francisco Bay was discovered by Portala in 1769, and a mission was established by the Franciscan friars in 1776. Soon after, the Spanish government stationed a garrison here. There was but little growth in the settlement until after the discovery of gold in 1848. With the influx of people consequent upon this discovery, San Francisco suddenly sprang into prominence and has continued to increase in numbers and commercial importance ever since.

On April 18, 1906, an earthquake shock was followed by a fire which in three days devastated four square miles in the heart of the city. The damage to property exceeded \$200,000,000, and 450 people lost their lives. Plans were at once perfected for rebuilding the city on a greatly-improved plan, and in less than ten years the devastated part of the city was rehabilitated with substantial steel-frame buildings. The Panama-Pacific International Exposition was held in San Francisco in 1915, and this brought thousands of people to the city from all parts of the world.

Population. The population of San Francisco is remarkable for its cosmopolitan character, and like the populations of New York and Chicago, it contains representatives of almost every nationality in the world. In 1900 the city had 342,000 inhabitants, and it grew rapidly until 1906, when the earthquake and fire caused a loss of about 100,000. However, a majority of those who left soon returned, and others have come, so the city has regained more than it lost. Population, 1910, 416,912. The government census of January, 1920, gave the city 506,676 people, a gain of 22 per cent. It is twelfth in size among American cities.

SAN FRANCIS'CO, or **SAO FRANCIS'CO**, a large river of Brazil, 1,200 miles in

length, rising in the state of Minas Geraes. It flows north northeast, then east, separating the state of Bahia from Pernambuco, and enters the Atlantic Ocean by two mouths.

SANHE'DRIN, the chief council of the Jews, originally having power over religious, criminal and civil cases. After the Romans assumed control of Palestine, however, their power was restricted to religious matters. At the time of Christ the Sanhedrin was composed of seventy-one members. It met daily in the Temple and was presided over by the high priest. Only Israelites of good character and well versed in the law could become members. The Sanhedrin tried Christ, and Stephen, Paul, Peter and John were brought before it on charges of heresy. After the fall of Jerusalem in A. D. 70 it disappeared.

SANITARY SCIENCE, that branch of science which deals with the maintenance of health and the prevention of disease by the regulation of external conditions. It treats especially of what is required of each individual, in his duty to his neighbor, so that by using such means as may insure his own health he may help preserve that of his neighbor. Food, personal hygiene, ventilation, drainage, quarantine and many other topics having to do with the maintenance of health are directly related to the general subject of sanitary science.

Related Articles. The various phases of this subject are fully treated in these volumes under the following headings:

Adulteration	Germ Theory of
Antiseptic	Disease
Aqueduct	Heating and
Bacteria and	Ventilation
Bacteriology	Hygiene
Bath	Inoculation
Breathing	Medicine
Domestic Science	Mosquito
Drainage	Physical Culture
Filter	Quarantine
Fly	Serum Therapy
Food	Sewage and Sewerage
Fumigation	Tenement
Garbage	Vaccination
	Water

SAN JACINTO, *sahn ja sin'toh*, **BATTLE** OF, the final engagement in the war for Texan independence, fought near San Jacinto Bay, Texas, April 21, 1836, between a force of about 750 Texans, under General Houston, and a Mexican force of 1,400, under General Santa Anna. The engagement was brief but fierce, a determined charge by the Texan force completely overwhelming the Mexicans. Santa Anna was taken prisoner, and Texas soon set up an independent government. See **TEXAS**, subhead *History*.

SAN JOAQUIN, *ho ah keen'*, a river of California having its source in a glacier in the Sierra Nevada Mountains, in the southwestern part of the state. It flows southwest, then northwest, and joins the Sacramento just before that stream enters Suisun Bay. Its length is about 350 miles; it is navigable to Stockton throughout the year, and during high water about 200 miles farther for small boats. The San Joaquin Valley is one of the most fertile regions in California.

SAN JOSE, *ho za'*, COSTA RICA, the capital of the republic of Costa Rica, is situated about forty-four miles east of Punta Arenas, a port of the Pacific, and sixty-eight miles west of Limon, on the Atlantic coast. It is on a line of railway connecting these ports. The town is well built, has wide, paved streets and electric lights. The most prominent buildings are the cathedral, the national museum, a school of law, the national library and the Institute of Physical Geography.

San José is situated about 3,800 feet above sea level, has a healthful climate and a pure water supply and is the center of a rich agricultural region. It was founded in 1738 and was made the capital of the country on the establishing of independence in 1823. Population, 1918, 35,657.

SAN JOSE, CALIF., the county seat of Santa Clara County, nearly fifty miles southeast of San Francisco, on the Guadalupe River, seven miles from San Francisco Bay, and on three lines of the Southern Pacific Railroad. The city is located in the beautiful Santa Clara valley, and is a popular health resort. It is the seat of the University of the Pacific, the College of Notre Dame and a state normal school. Other prominent buildings are a city hall, a courthouse, a hall of records, a postoffice, a large hotel and five bank buildings. The city also has two libraries and two public parks. The Lick Observatory is on Mount Hamilton, eighteen miles to the west. Alum Rock Park, with its mineral springs and natatorium, seven miles distant, is also of interest. Large quantities of fruit and grain are raised in the valley, and fruit-packing is one of the most important industries of the city. There are also foundries, marble works, and fruit drying and canning. A Spanish town was founded here in 1777, and the mission of San José was established two years later. United States troops took possession of the place in 1846, and it was the capital of California from 1849 to 1851. The commis-

sion form of government was adopted in 1916. Population, 1910, 28,946; in 1920, 39,604, a gain of 37 per cent.

SAN JOSE SCALE, the most destructive of scale insect pests, was introduced into America from China, but takes its name from San Jose, Calif., where it was first discovered. The insect is so small that it usually makes great headway before being discovered, the largest scales being no larger than the head of a pin. The color is gray, and an infested tree looks as though it were covered with ashes. The scale is particularly destructive to fruit trees, and causes hundreds of thousands of dollars' loss every year. It is estimated that a single female scale may produce over 3,216,000,000 young in a year. The scales are blown about by the wind and are carried by birds and insects; it is therefore impossible to confine them to a single tree or orchard. Spraying the trees with a mixture of lime, sulphur and salt, or with a solution of whale-oil soap containing potash lye, or a mixture of kerosene soap or crude petroleum and hydrocyanic acid gas, is the best means of destroying the insects. The ladybird beetle is a persistent enemy of the San José scale.

SAN JUAN, *hwaahn*, PORTO RICO, the capital, largest city and chief seaport of the island, is situated on a small island on the north coast of Porto Rico and connected with the mainland by a bridge. The city is surrounded by a wall, built two hundred fifty years ago. It has an excellent harbor, is regularly laid out and contains a number of plazas and squares. Since the occupation of the island by the United States, the sanitary conditions have been greatly improved. The streets are narrow, the houses are mostly constructed of stone and are of a massive style of architecture. The principal buildings are the city hall, the theater, the military hospital, the Jesuit College, the palaces of the captain-general and the bishop, and a Carnegie Library costing \$100,000. The city also has a large market place. It is an important center of tobacco manufacture. Population, 1920, 71,443 (Federal census). See PORTO RICO.

SANKEY, IRA DAVID (1840-1908), an American evangelist, singer and composer, born in Edinburgh, Pa. He was chiefly known for his association with Dwight L. Moody, whom he first met in Indianapolis in 1870. Sankey had a fine baritone voice, and for many years conducted the singing for Moody's evangelistic work.

SAN LUIS POTOSI, *loo ees'po toh se'*, MEXICO, capital of the state of San Luis Potosi, and fourth city of the republic of Mexico, is situated 215 miles northwest of Mexico City on a plateau 6,200 feet above the sea. It is regularly built, has good streets and several plazas, or parks. The most important buildings are the governor's palace, the palace of justice, the townhall, the mint, the exchange, the theater and the Church of San Pedro. The city is an important railroad center and has a large trade in cattle, hides, tallow and wool. It is the seat of a United States consul.

The city first attained its prominence because of its proximity to the famous San Pedro silver mines, which have been abandoned. At present there is a good trade in pottery, mineral products and hides. The manufactures include furniture, woolen goods, soap and cigars. The city was the center of a revolution which broke out in 1910, and was captured by the Constitutionalists in 1914. Population, 1914, 82,946.

SAN MARINO, *sahn mah ré'no*, a tiny republic, the oldest in Europe, situated in Northern Italy, about twelve miles from the Adriatic. It has an area of about thirty-eight square miles and a population of about 10,000. The chief industries are wine-making and cattle-raising. The legislative body of the republic is a Council of sixty members, elected by popular vote. From among these is chosen annually a smaller executive council and, semi-annually, two executive officers called regents. The republic issues its own postage stamps and copper coins. There is no public debt. San Marino, the capital, situated 2,650 feet above the sea, is a quaint old town, which has existed since the fourth century. A treaty of friendship exists between the republic of San Marino and Italy, and when the latter declared war against Germany in 1915, the little republic followed suit and sent a thousand men to the war.

SAN MARTIN, *sahn mahr teen'*, a distinguished South American general and a leader in securing South American independence, was born in Argentina and educated in Spain. He entered the army and gained distinction in the war against France, rising to the rank of lieutenant-colonel. In 1811 he learned that the Spanish colonies in South America had rebelled, and at once went to Buenos Aires, organized a group known as the mounted grenadiers, and was given command of a

large patriot army. In 1815 he raised an army for the liberation of Chile, but did not reach that country until two years later. He won two important victories over the Spanish forces, one at Chacabuco and the other at Maipo in 1818. After organizing the government of Chile, he helped the Peruvians to gain their independence, and was made Protector of Peru. While in office he instituted a number of needed reforms, then turned his office over to Simon Bolivar (which see), and sailed for Europe, where he died.

SAN SALVADOR', CENTRAL AMERICA, capital of the republic of Salvador, 120 miles southeast of the city of Guatemala. The city occupies a valley between wooded hills, and to the northwest is the volcano of San Salvador. A railway connects the city with Santa Ana and La Libertad. The chief buildings are the national palace, the university, the cathedral, the national library and an astronomical observatory. The city also has a botanical garden. Its trade in agricultural produce is considerable, and it ships large quantities of indigo. Population, 1916, 65,148.

SANSKRIT LANGUAGE AND LITERATURE. Sanskrit is the classic and sacred language of the ancient Hindus, and the language in which most of their vast literature is written. The date of the introduction of Sanskrit into India is unknown, but it was at least as early as 1500 B. C. It has not been a living and spoken language since 200 B. C., so the ancient forms have been preserved without change. It belongs to the Indo-European family of languages, and is related to the Persian, Greek, Latin, Teutonic, Slavonic and Celtic tongues. It stands in the same relation to the modern Aryan languages of India as Latin does to the languages of Southeastern Europe that are known collectively as the *Romance* languages.

The great value of Sanskrit to the student of languages lies in the fact that through all the centuries it has preserved without change the characteristics of the common language from which the modern languages of India and Europe sprang (see PHILOLOGY). It has exercised great influence on the scholarship of the world, for its study has led to the study of comparative philology, comparative mythology and comparative religion. Moreover, scholars have arrived at an understanding of the development of Greek, Latin, German, and English largely by comparing them with Sanskrit.

The literature may be divided into two great divisions—the *Vedic*, represented by the *Vedas*, or sacred books of the Hindus, and Sanskrit proper, in which secular works are written. The Vedic is the older, and is sometimes called *Old Sanskrit* (see *VEDAS*).

Many of the fables about animals and the fairy tales that have gladdened the hearts of echildren in Europe and America for centuries were originally taken from the Sanskrit.

SANTA ANA, CALIF., the county seat of Orange County, thirty-three miles southeast of Los Angeles, on the Southern Pacific and the Santa Fé railroads and an electric line. The city is in the midst of one of the most fertile regions in Southern California. The industries include the canning of fruit and vegetables, the manufacture of beet sugar and flour, the dressing of lumber, the making of collar pads and the manufacture of soda. Newport Beach is eight miles distant. Population, 1910, 8,429; in 1920, 15,485, a gain of 84 per cent.

SANTA ANNA, or **SANTA ANA**, *sahn'ta-ah'na*, ANTONIO LOPEZ DE (1795?-1876), a Mexican general and politician. He entered the army early, took a prominent part in the expulsion of the Spaniards from Mexico and was at first a supporter of Iturbide. Later he went over to the republicans and helped to overthrow Iturbide. He was in the front during all the subsequent Mexican troubles till 1833, when he became president. By 1835 he had made himself practically the dictator of Mexico. In 1836 Texas seceded, and in the war which followed Santa Anna, after a victory at the Alamo, was defeated at San Jacinto by Houston and taken prisoner. In the following year he was released, on condition of recognizing the independence of Texas. In 1841 he was again made president, but three years later his opponents captured him and banished him to Havana. Recalled in 1846, he was again made president, and during the war with the United States he commanded the Mexican army (see *MEXICAN WAR*). Owing to his repeated defeats, and especially to the capture of Mexico City, he resigned and left the country. He was recalled again in 1853 and was made president, but two years later he was again driven from the country. He returned after the death of Juarez, and died in obscurity in Mexico City.

SANTA BARBARA, *bahr'ba ra*, CALIF., the county seat of Santa Barbara County, 100 miles northwest of Los Angeles, on the Santa

Barbara Channel and on the Southern Pacific railroad. The city is picturesquely located on a slope above the bay, has a warm, equable climate and is visited by many tourists and health-seekers. The luxuriant growth of flowers, tropical plants and fruits helps to make the city a delightful residence place. The old Franciscan mission here was established in 1786. It is one of the most important and the best-preserved in California, and it is the only one in which services never have ceased to be held. Other prominent buildings are Anthony's College, hotels, two hospitals, the Arlington and Potter hotels and a public library. Large quantities of beans, English walnuts, lemons and olives are grown in the neighborhood, and the city ships considerable fruit, live stock, wool, petroleum and various minerals. There is a packing house and a film company. Santa Barbara was settled by the Spaniards in 1782, and was incorporated as a city in 1874. The commission form of government was adopted in 1915. Population, 1910, 11,659; in 1920, 19,441.

SANTA CLAUS, *k'laws*. See *NICHOLAS, SAINT*.

SANTA CRUZ, *krooth*, CALIF., the county seat of Santa Cruz County, seventy-five miles south of San Francisco, on the Bay of Monterey and on the Southern Pacific Railroad. There are also steamship lines for coastwise commerce. The city is beautifully located on a slope above the bay, has a mild, equable climate and is one of the most popular resorts for tourists in the central part of the state. It contains a good bathing beach, picturesque drives and a large public park, overlooking the bay. The surrounding region produces large amounts of fruits, and the city contains a powder mill, and manufactures cement, asphalt, lumber and other goods. It has a large public library. Not far distant are Sequoia Park and Big Tree Forest. The place was settled by Franciscan missionaries in 1791, and the city was incorporated in 1876. The commission form of government is in effect. Population, 1910, 11,146; in 1920, 10,917.

SANTA FE, *fay'*, ARGENTINA, the capital of Santa Fé province, on the east bank of the Salado River, 230 miles northwest of Buenos Aires. It is connected with numerous cities by rail, and is the seat of a normal school, a Jesuit college, a university and a seminary. It is an important shipbuilding center and

has considerable trade in cattle, hides and lumber. Population, 1916, 59,754.

SANTA FE, *san'tah fa'*, N. M., the capital of the state and the county seat of Santa Fé County, twenty-one miles east of the Rio Grande River, eighty-five miles northeast of Albuquerque, on the Denver & Rio Grande, the Atchison, Topeka & Santa Fé and the New Mexico Central railroads. The site of the city was first visited by Spaniards about 1542, when they found a large pueblo, containing some 15,000 Indians. About 1605 the Spaniards found the place deserted and made a settlement, enslaved the neighboring Indians and opened up extensive gold and silver mines. In 1680 the Indians captured the place, but the Spaniards regained possession in 1692. It was taken by United States troops in 1846. In 1851 it was made the capital of the newly-organized territory and was chartered as a city in 1890. Next to Saint Augustine, Fla., it is the oldest white settlement in the United States.

Santa Fé is beautifully situated on a plain almost 7,000 feet in elevation, and is surrounded by mountain peaks rising to heights of from 10,000 to 13,000 feet. The old Spanish section has narrow, crooked streets, and the buildings are low, one-story adobe structures. The modern part has wide streets and contains many good business blocks and fine residences.

In the center of the city is a public square, known as the Plaza. Facing this on the north is the old governor's mansion, a one-story adobe building, about a square in length, containing an inside court, and built in the early part of the seventeenth century. Here all the governors of the territory, both Spanish and American, resided until 1909, and it was here that General Lew Wallace, when territorial governor, finished writing *Ben Hur*. In connection with this building is an historical museum, containing early Spanish paintings and many interesting relics. Also of historical interest are the Church of San Miguel, old Fort Marcy, Rosario Chapel, the partly rebuilt Cathedral of San Francisco, and a Scottish Rite Cathedral. The educational institutions include the Saint Michael's College, Loretto Convent, Allison Mission, Mary E. James Mission School, the School of American Archaeology and the government and Saint Catherine's Indian schools, and a school for the deaf and dumb. Other prominent buildings are the capitol, the governor's

mansion, the penitentiary, the Federal building, a hospital and the territorial orphan asylum.

In the vicinity are kaolin mines and deposits of coal, but stock raising is the most important industry. The city is principally engaged in wholesale and retail trade with the surrounding region. As a business center it has declined since the construction of the railways and the abandonment of the overland route by way of the Santa Fé trail. The excellent climate has made the city a popular health resort, and its historic interests attract many tourists. Population, 1920, 7,236.

SANTIAGO, *sahn te ah'go*, CHILE, the capital and largest city of the republic, is situated on a beautiful valley between the Andes and the Chilean coast range, on a branch of the Maipo River. It is sixty-eight miles southeast of Valparaiso. The city is well laid out; the streets are paved and lighted by electricity, and there is an excellent electric street railway system. Owing to the prevalence of earthquakes, many of the houses are of only one story and usually occupy a large space of ground, having gardens around them and courts in the interior. The city contains a number of prominent public buildings of recent construction and these add much to its beauty. Among them are the hall of congress, the mint, the exposition palace, the academy of sciences, the national library and the national museum. The city contains a number of educational institutions, among them the University of Chile, founded in 1743, and a normal institute. There are also a botanical garden, an observatory and a number of beautiful parks. The manufactures are of little importance. Santiago was founded in 1541 by Valdivia. On August 16, 1906, an earthquake destroyed hundreds of buildings, valued at more than \$10,000,000, killed several hundred people and rendered thousands homeless. Santiago has railway connection with Valparaiso, Concepcion and Buenos Aires. Population, 1920, 502,296.

SANTIAGO, BATTLE OF, a naval battle during the Spanish-American War, fought off Santiago de Cuba, July 3, 1898, between a United States squadron, under Sampson and Schley, and a Spanish fleet, under Admiral Cervera. The Americans had confined Cervera's squadron to the harbor of Santiago for several weeks, while the land forces were completing the investment of the city. Cervera was ordered by his government to at-

tempt to make his escape, and on the morning of July 3 he led a dash from the harbor. After a running fight lasting most of the day, all the Spanish vessels were beached or destroyed, and Cervera and 1700 men were taken prisoner, while 350 Spaniards were killed and 160 wounded. The American loss was one man killed and ten wounded. See SPANISH-AMERICAN WAR.

SANTIAGO DE CUBA, the second city and seaport of Cuba, is situated on an excellent harbor on the south coast of the island, 470 miles southeast of Havana, with which it is connected by rail. The harbor is entered through a narrow channel, which is defended by forts. Its chief buildings are a cathedral and a government palace, a theater and military and other hospitals. The city also has a number of charitable and industrial institutions. It is situated in the midst of a rich agricultural district and exports sugar, hides, wax, tobacco and copper and iron ore. There are a few iron foundries and machine shops and tobacco factories. The town was founded in 1514; it was the chief point of attack by the Americans during the war with Spain and was captured by them July 3, 1898. It was from this harbor, also, that the Spanish fleet attempted to escape at the time of its capture by the United States squadron (see SPANISH-AMERICAN WAR). Population, 1910, 53,614; in 1919, 70,232.

SANTO DOMINGO, **SANTO DOMINGO**, the oldest existing European settlement in the New World and capital of the Dominican Republic, is situated on the southwest coast of the island, at the mouth of the Ozama River. It is a typical Spanish city and is surrounded by an old wall, built in the early days of the settlement as a defense against pirates and the natives of the island. Most of the inhabitants dwell in thatch-covered houses; ruins of stone mansions, however, give some idea of the former grandeur of the place. The most interesting building is the Cathedral in which Columbus and his son were formerly buried. In the principal square is a statue to the great navigator. The city was founded by Bartholomew Columbus, in 1496. It has a good harbor and is an important center for the export of coffee and sugar. Population, 1921 census, 45,021.

SANTO DOMINGO, or **SAN DOMINGO**, also called the Dominican Republic, a republic occupying the eastern part of the island of Haiti. Its area is 19,332 square miles, mak-

ing it about twice the size of the state of Maryland. (For physical features, see HAITI.) Most of the land is suitable for cultivation, and in the south and west there are some large plantations. The chief products are sugar cane, coffee, cacao and tobacco. A considerable area is covered with forests of valuable timber, such as mahogany, satinwood, cedar and logwood. There are some minerals, including gold, iron, copper and coal, but they have not been worked.

The inhabitants are a mixed race of Spanish, Indian and negro descent. The Spanish language is in general use. The prevailing religion is Roman Catholicism. Santo Domingo became an independent republic in 1844, and adopted a constitution, which has several times been revised. The executive branch of the government consists of a President, chosen by an electoral college for six years, and his Cabinet of seven ministers. The legislative branch consists of two houses, a Senate of twelve members, elected for six years, and a Chamber of Deputies, of twenty-four members, elected for four years. Each province is administered by a governor appointed by the President.

The state maintains high schools and normal schools, and throughout the republic primary education is practically compulsory. There are about 175 miles of railroad and 700 miles of telegraph lines. At the capital are two banks, the National Bank of Santo Domingo and a branch of the Royal Bank of Canada, which also has a branch at Pedro de Macoris. Most of the trade is carried on with the United States, which in 1905, in accordance with a friendly treaty, assumed charge of the customs in an effort to bring about a settlement of the obligations of citizens to foreigners doing business in the republic. The United States put down a revolt in 1913 and another in 1915. As a result of the impeachment of President Enrique Jimenez a revolt occurred in 1916 which the United States suppressed. Afterward it put the republic under martial law. In June, 1917, Santo Domingo took the side of the allies and severed diplomatic relations with Germany. Population, 1921 census, 897,405.

SANTOS, *sahn'tos*, **BRAZIL**, on the Atlantic Ocean, thirty miles southeast of São Paulo. It has a deep harbor, and, next to Rio Janeiro, is the most important seaport of the country. The city is well built and has good streets and a number of parks, as well as public institu-

tions of importance. It is the world's chief port for the shipping of coffee, the number of sacks exported yearly being nearly about nine million. Population, 1916, 91,500.

SANTOS-DUMONT', ALBERTO (1873-), a French aeronaut, who became famous in the early days of aerial navigation. He was born at São Paulo, Brazil, and was educated in France. He inherited a large fortune, most of which he devoted to experiments in air navigation, making his first successful flight with a dirigible in 1899. For this feat he was given the Henri Deutsche prize of 100,000 francs. He was made a Chevalier of the Legion of Honour in 1904, and Officer in 1904. His account of his experiments, *My Airships: A Story of My Life*, was published in 1904. See FLYING MACHINE.

SAO FRANCISCO. See SAN FRANCISCO (river).

SAONE, *sone*, a river in the eastern part of France, which rises in the department of Vosges, flows southwest, then south, and joins the Rhone at Lyons. It is a link of an extensive waterway, being navigable two-thirds of its 300 miles and connected by canal with the Seine, the Meuse, the Rhine, the Loire and the Moselle. Chalon-sur-Saône, one of the largest industrial cities of France, is on its banks.

SAO PAULO, BRAZIL, the capital of the state of São Paulo, and second city of the Republic, is situated 210 miles southwest of Rio de Janeiro, and twenty-five miles from Santos, its seaport. The city is on a plateau, and has a mild and healthful climate. São Paulo is rapidly-growing, is modern in every respect, and has the reputation of being one of the cleanest cities in North and South America. The city has long streets traversed by street railways, lined with busy shops and lighted by electricity. The cathedral, the government building, the treasury, the Episcopal palace and the Ypiranga Palace, erected to commemorate the Declaration of Independence, are the most important buildings. There is a large hospital, also a law school that is widely known.

São Paulo is the leading manufacturing city of Brazil, and it owes its wealth and progress to the great state of which it is the capital. From this state is shipped more than half the world's supply of coffee. The city has railway connection with Rio de Janeiro, Santos, Buenos Aires and the leading cities

of the surrounding states. São Paulo was founded in 1354, but its present growth did not begin until 1890. Population in 1911, 450,000; in 1920, 565,000.

SAP, the juice or fluid which circulates in all plants. Sap is to the plant what blood is to the animal. There are two kinds of sap, namely, *crude sap* and *elaborated sap*. Crude sap consists of the watery fluid taken up by the roots. It contains in solution the plant food taken from the soil. The elaborated sap is formed from the crude sap by the changes it undergoes in the leaves. It is the latter that nourishes the plant.

The circulation of sap is studied most conveniently in a tree. The tree has two kinds of wood, the dark hard wood in the center, known as the *heart wood*, and the light, softer wood under the bark, known as the *sap wood*. The crude sap is taken up by the roots, and it ascends the trunk and branches until it reaches the leaves, where it is changed to elaborated sap. From the leaves the elaborated sap returns to the branches and trunk, which it descends to the roots. It circulates between the bark and the wood, and forms the new layer of wood each year. In some trees this sap has the appearance of mucilage; in others it is more like water. In several species of trees such as the elm, the hemlock and the willow, this sap so loosens the bark in late spring and early summer that the bark can be easily stripped from the tree.

Sugar is made from the sap of beets, sugar cane and the sugar maple. Opium and many other used drugs are made from the sap of plants. The fluid from which rubber is made is not, botanically considered, sap. See PLANT; TREE.

SAPAJOU, *sap'a joo*, a group of South American monkeys, characterized by their small size, long tails and general intelligence. The monkeys carried around by organ grinders are usually sapajous. The largest species measures forty inches in length, including twenty inches of tail. The best-known species are the *white front*, having a white forehead and light brown fur; the *spider* monkeys, and the *capuchins*, the latter so called because the hair on the head resembles a monk's hood. These monkeys live in trees and feed upon fruit, insects, and sometimes small animals. See MONKEY.

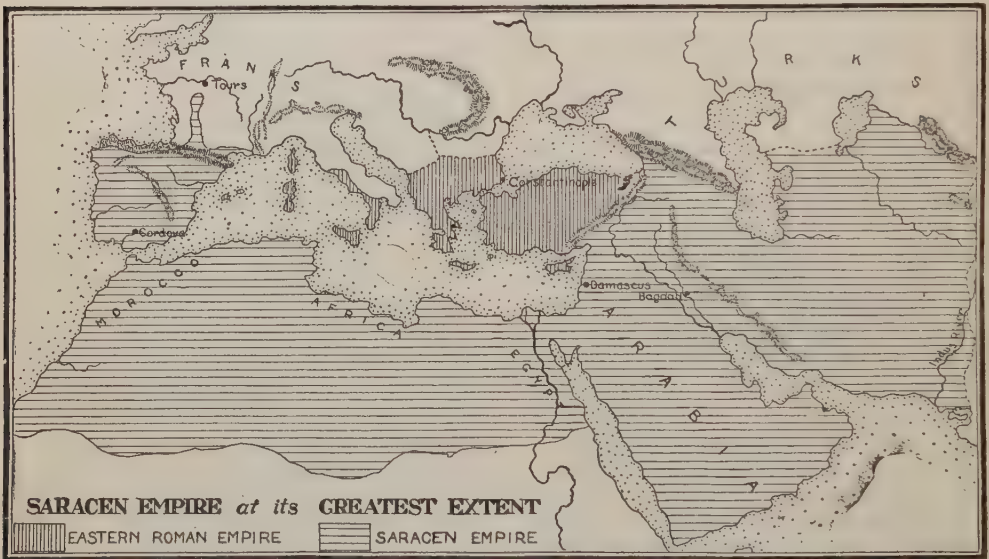
SAPPHIRE, *saf'ire*, a transparent, blue stone, next in hardness to the diamond, belonging to the corundum class. Sapphires

are found in Burma, India and Ceylon, in Asia; Bohemia and Silesia, in Europe; and in the United States, chiefly in Montana. Sapphires vary from pale blue to deep indigo, but the most valuable are of cornflower tint. The sapphire is the birthstone for September.

SAPPHO, *saf'o*, a celebrated Greek poetess, born probably in the seventh century B. C., at Mitylene, on the island of Lesbos. Little is known regarding her life, but she has been made the subject of many legends. At Mitylene, Sappho appears to have been the center of a group of maidens whom she instructed in the art of song. Her odes, elegies and epigrams, of which only fragments have come

SAPUL'PA, OKLA., the county seat of Creek County, in the heart of the oil district of the state, 105 miles northeast of Oklahoma City and fourteen miles from Tulsa, and on several lines of the Saint Louis & San Francisco Railroad. There are oil refineries, glass factories, cotton compresses and numerous lesser enterprises. The city has a government Indian school, a Carnegie Library and a hospital; a Federal building is in prospect. Population, 1900, 891; in 1920, 11,634, a gain of 41 per cent.

SARACENS, *sar'a senz*, the name applied by the ancient Greeks and Romans to the inhabitants of Northern Arabia. During the



down to us, display deep feeling and imagination. By the ancients she was known as the "Lesbian nightingale."

SAPSUCKER, a group of birds belonging to the woodpecker family, given their name because they feed on the sap of trees, which they obtain by pecking holes through the bark. There are several varieties, but the *yellow-bellied sapsucker* is the best known. The male has a red head and throat and a black coat with white markings. It is found throughout the northern part of the United States and Canada. The nest is made in holes in trees, and the eggs, seven or eight in number, are white. The *red-breasted sapsucker* and the *Williamson sapsucker* are found west of the Rocky Mountains. See **WOODPECKER**.

Middle Ages, the name was applied to all Mohammedans and to the Arab Moors who in the eighth century set up a kingdom in Spain, and attempted to overrun Europe. Their plan was frustrated by Charles Martel at the Battle of Tours, where the Saracens suffered a disastrous defeat.

SARAGOSSA, *sah ra gohs'sa*, SPAIN, capital of Saragossa province and an important commercial city, is situated on the Ebro River, 212 miles northeast of Madrid and on the site of an ancient Iberian town. The center of the city is characterized by narrow, crooked streets and old, dilapidated buildings. Around this center has been built a modern city with broad streets and modern buildings. The most important buildings are the cathedral, dating from the twelfth cen-

tury, the archbishop's palace and the Castilio de la Aljaferia, which was at one time the residence of the king of Aragon. There are several higher schools, including a university founded in 1474. The city is an important railroad and industrial center. Its manufactures include foundry and machine shop products, flour, glass, chemicals, soap and candles. Population, 1920, 141,350.

SARAJEVO, *sar'aya vo*, or **SERAJEVO**, the capital city of Bosnia, formerly a province of the Austro-Hungarian monarchy. The city was the center of worldwide interest in June, 1914, when it was the scene of the assassination of the heir apparent to the Austrian throne. Out of this tragedy came the World War, lasting until 1919. Serajevo has a delightful situation in a gardenlike region along the Miljacka River. It is 122 miles southwest of Belgrade, with which it hereafter will be associated as a city of Jugo-Slavia. The Bosnian capital has many modern improvements, as well as picturesque antiquities. Among the institutions is a Roman Catholic seminary. In normal years the place is a thriving trading center, with metal-ware factories, dyeing and silk weaving plants, potteries and a large brewing establishment. Population, about 52,000. See **WORLD WAR**; **JUGO-SLAVIA**.

SARATOGA, BATTLES OF, two engagements near Saratoga Lake, N. Y., which were the turning point in the Revolutionary War. They are also known as the Battle of Freeman's Farm, the Battle of Bemis Heights and the Battle of Stillwater. The British general, Burgoyne, with a force of 10,000 men, had marched from Canada by way of Lake Champlain, expecting to meet the forces of Lord Howe, who was in New York, at Albany, and form a line of military outposts that would separate the New England colonies from the other colonies. At Saratoga Burgoyne met an American army under the command of Arnold, Gates and Schuyler. On September 13, 1777, Burgoyne advanced against the American position on Bemis Heights, but was unable to dislodge the Americans from their position, and it was three weeks before the contest was renewed. On October 7, the British made a second attack on the Americans, and were disastrously defeated. The assistance which Burgoyne expected failed, his supplies were cut off, his forces were completely surrounded by the Americans, and he was forced to surrender October 17. This

victory so advanced the prestige of the American cause in Europe that a treaty of alliance with France was negotiated, and with the assistance of the French, the American cause eventually triumphed. The Battle of Saratoga is regarded as one of the decisive battles of the world. See **FIFTEEN DECISIVE BATTLES**.

SARATOGA SPRINGS, N. Y., in Saratoga County, thirty-eight miles north of Albany, on the Boston & Maine and the Delaware & Hudson railroads. It has about fifty springs, which give forth waters with medicinal properties, and is a very popular health and summer resort. The village is on the southernmost spur of the Adirondacks, at an elevation of about 300 feet, in a region free from swamps and marshes. There are large hotels, which are said to have accommodated as many as 40,000 guests at one time. A Convention Hall, seating 6,000 people, has made it a favorite place for conventions. Saratoga Lake, four miles distant, has been the scene of numerous regattas. The races during August and a floral fête in September also add to the popularity of the resort. The village contains an athenaeum, a public library, an art school, a town hall, Saint Faith School, a state armory, a home for orphans and two hospitals. Since 1826 the mineral waters have been shipped to various parts of the world. The principal industries are the bottling of these waters, the making of carbonic acid gas and the manufacturing of foundry products, paper-mill machinery and supplies for druggists and doctors.

Saratoga is an Indian name meaning *hill-side of the great river*. The first building was erected in 1773, but the village did not begin to grow until twenty years later. Population, 1910, 12,693; in 1920, 13,181, a gain of 4 per cent.

SARATOV, *sah ra tohf'*, **RUSSIA**, capital of a government (province) of the same name, 32,624 square miles in area. The city is 450 miles southeast of Moscow, east of the Ukraine. It is a city of wooden buildings, chiefly, but before the World War was prosperous. It has a university, founded in 1909, schools of theology and drawing, and a museum. Population, 1913, 235,500.

SARCOPHAGUS, *sahr kof'a gus*, a stone coffin. The earliest specimens were found in Egypt and were made of alabaster, limestone, granite or some other durable material. The oldest ones are rectangular in shape and have a flat or curved cover and little orna-

mentation. But the later ones have the shape of the human body and are covered with inscriptions or with carved figures of the kings. The Greeks, Romans and other ancient people made use of stone coffins, and those of the wealthy were ornamented with beautiful designs cut in the stone. Stone coffins are common at the present time among persons of wealth.

SARD, or **SARDOIN**, a variety of chalcedony, which displays on its surface a rich reddish-brown, but when held between the eye and the light appears of a deep blood-red hue. See **CARNELIAN**.

SARDANAPALUS (668-624 B. C.), the name given by the Greeks to the last of the great Assyrian kings, who is generally known in history as **ASSURBANIPAL**. He reigned in Nineveh for forty-two years, and was noted for his interest in literature and art, as well as for his military prowess. He erected magnificent buildings at Nineveh and Babylon, and collected at Nineveh a great library consisting of thousands of clay tablets engraved in cuneiform characters. Many of these tablets are now in the British Museum.

SARDINE, *sahr deen'*, a small fish of the herring family, abundant in the Mediterranean and also on the Atlantic coasts of France, Spain and Portugal. It is much esteemed for its flavor, and large quantities are preserved by being salted and partly dried, then scalded in hot olive oil and finally hermetically sealed in tin boxes, with hot salted oil or with oil and butter. Commercially the name is applied to any small fish put up in oil. On the eastern coast of Maine, young menhaden are canned as sardines, but they are much inferior to the real sardine of Europe. The sardine of the Pacific coast of the United States is a valuable food fish, but it is not canned. It is about a foot long, dark-bluish above and silvery below.

SARDINIA, the second island in size in the Mediterranean Sea, forming a part of the kingdom of Italy. It is 115 miles southwest of Italy, and is separated from Corsica by the Strait of Bonifacio, nine miles wide. Sardinia is 170 miles long, eighty miles wide in the widest place, and has an area of 9,306 square miles, about equal to that of the state of New Hampshire. The interior is mountainous and hilly, and has many rapid streams. The valleys between the mountains are noted for their fertility, and live stock, wheat, olives, grapes, oranges, lemons and

tobacco are raised. About one-fifth of the land is covered by forests.

The chief minerals are lead, zinc, silver and antimony. These, with lignite, granite and salt, constitute the commercial products of the mines. The island has a valuable foreign trade, exporting minerals and agricultural products, and importing such manufactures as are needed by the inhabitants. Politically it is divided into two provinces, Cagliari and Sassari. Cagliari, the capital, has about 60,000 inhabitants; the population of the island is about 864,000. It was formerly a part of the kingdom of Sardinia.

SARDINIA, KINGDOM OF, a former kingdom of the south of Europe, the nucleus of United Italy, composed of the island of Sardinia, the duchy of Savoy, the principality of Piedmont, the county of Nice, the duchy of Genoa and parts of the duchies of Montferrat and Milan. In 1720 Victor Amadeus, duke of Savoy, on receiving the island of Sardinia in exchange for Sicily, took the title of King of Sardinia. Turin was the capital, and Piedmont, not the island, was the most important part of the kingdom. Amadeus was succeeded by Charles Emmanuel I, Victor Amadeus II and Charles Emmanuel II, the latter of whom, in 1802, abdicated in favor of his brother Victor Emmanuel I, the royal family having by this time, on account of the invasion of Italy by Napoleon, taken refuge on the island of Sardinia. In 1814 the king returned to Turin. An insurrection brought about his abdication in 1821 in favor of Charles Felix, who, after a reign of ten years, was succeeded by Charles Albert. In 1848 Charles Albert headed the league which endeavored to drive the Austrians from Italy. The defeat of the Sardinian forces at Novara (1849), however, caused him to abdicate in favor of his son, who came to the throne as Victor Emmanuel II.

The position of Sardinia was strengthened by the part which it played in the Crimean War, and in 1859 the coöperation of France was secured in a war against Austria. The brief campaign which followed ended in the defeat of the Austrians at Magenta and Solferino and resulted in the cession to Sardinia of a large increase of territory, though she was compelled to cede Savoy and Nice to France. Soon after this the Sardinian kingdom was merged in the united Italian kingdom under Victor Emmanuel. See **VICTOR EMMANUEL II**; **ITALY**, subhead *History*.

SARDONYX, *sahr'doh niks*, a precious stone, a beautiful and rare variety of onyx, consisting of alternate layers of sard and white chalcedony. The name has sometimes been applied to a reddish-yellow or nearly orange variety of chalcedony, resembling carnelian, and also to carnelians, the colors of which are in alternate bands of red and white. Sardonyx is deemed by many theologians to be the emblem of spiritual strength. See ONYX.

SARDOU, *sahr doo'*, VICTORIEN (1831-1908), a French dramatist, born in Paris. He at first studied medicine, but abandoned this in favor of literature. His earliest venture was the comedy of *The Students' Inn*, which proved a failure, at the Odeon. However, he continued his efforts and soon attained success in every field of the drama, with the exception of tragedy. His better known works, many of which have been produced on the English stage, are *Our Intimates*, *The Butterfly*, *Daniel Rochat*, *The Benoiton Family*, *Dora* and *Madame Sans Gêne*. His later successes were associated with Madame Bernhardt, for whom he wrote *Fédora*, *Théodora*, *La Tosca* and *The Sorceress*; *Robespierre* was written for Sir Henry Irving.

SARGASSO SEA, *sahr gas'oh*, a large tract of seaweed in the North Atlantic Ocean located between the 25th and 30th parallels, north latitude, and the 38th and 60th meridians, west longitude, although its position changes slightly owing to the influence of winds and currents. The sea has about four-fifths the area of Texas. It was discovered by Columbus on his first voyage, and his ships were delayed by it. It is avoided by navigators because it is more or less of an obstruction to ships.

SARGENT, JOHN SINGER (1856-), one of the foremost American portrait and genre painters, was born at Florence, Italy, of American parents. He was educated in Italy and Germany. At the age of eighteen he became the pupil of Carolus Duran, who greatly influenced his career. When twenty years old he made his first visit to the United States, and subsequently has spent short periods in America. His home, however, has always been in Paris or London.

Sargent ranks as one of the greatest portrait artists of his time, and numbered among his sitters Duran, Monet, Edwin Booth, Joseph Jefferson, Ada Rehan, Ellen Terry as

Lady Macbeth, John Hay, and Theodore Roosevelt. *Carmencita*, a dancer in costume, and *Carnation Lily*, *Lily Rose*, two girls lighting Japanese lanterns in a flower garden, are among his most popular pictures; paintings in the Boston Public Library are among the finest of his mural decorations. He has also executed many landscape and figure pieces.

SAR'NIA, ONT., the county seat of Lambton County, on the Saint Clair River and on the Canadian National and the Pere Marquette railways, sixty-one miles west of London. It is connected with Port Huron, across the river, by ferries and by a railway tunnel about one and one-quarter miles long. The leading industrial establishments include foundries, machine shops, oil refineries, salt works and factories for the manufacture of engines and agricultural implements and woolen goods. Population, 1911, 9,947; in 1921, 14,887.

SARPEDON, *sar pe'don*, a hero of the Iliad, was king of the Lycians and ally of the Trojans. He was slain by Patroclus, and his body was rescued and purified by Apollo. According to different accounts, he was either the son of Jupiter and Laodamia or the grandson of another Sarpedon, the son of Jupiter and Europa.

SARSAPARIL'LA, a drug obtained from the roots of several species of smilax. The plants are tough, twining shrubs, with prickly stems, small flowers and shiny leaves. They are natives of the warm regions of America, being found in South America and on the Mexican Andes. The dry roots of the plant are used in medicine and are odorless and bitterish. Formerly sarsaparilla was considered an efficacious cure in various diseases, but it is now used mostly in spring medicines. Though popularly believed to have a mild tonic effect, physicians and chemists do not consider it valuable as a remedy. It is used to some extent for flavoring soda water.

SARTO, *sahr'toh*, ANDREA DEL (1487-1531), a Florentine master, known for the excellence of his technique as the "Faultless Painter." His real name was ANDREA VAN-NUCCHI, Del Sarto (meaning *the tailor's son*) being a nickname because of his father's trade. Del Sarto studied painting under several Florentine masters, and at the age of thirty already had executed a beautiful series of frescoes in the Church of the Servites and was recognized as one of the best

fresco painters in Florence. Ten scenes from the life of John the Baptist and a *Last Supper* are among his famous frescoes; the most celebrated of his single paintings are the *Madonna del Sacco*, for the Servites, and the *Madonna of the Harpies*, now in the Uffizi Gallery. Other famous paintings include the *Annunciation*, several Holy Families, a number of portraits, and numerous subjects for altar pieces. His oil paintings are found in almost every European art gallery. Del Sarto was the inspiration of one of Brown-ing's famous poems, *Andrea Del Sarto*.



SASKATCHEWAN, *s a s*
katch'e wuhn, a province
of the Dominion of Cana-
da, lying south of the
North West Territories
and north of the Amer-
ican states of Montana
and North Dakota. It
touches two other organ-
ized Canadian provinces,
Alberta on the west and
Manitoba on the east.

Saskatchewan was
formed in 1905 from parts of the districts
of Alberta, Saskatchewan and Assiniboia.
Its north and south extent is 760 miles;
the northern boundary is 277 miles long,
and the southern is 393 miles. The area,
251,700 square miles, is over twice that
of New Mexico, and is smaller than that
of Manitoba by only 132 square miles.
Among the organized Canadian provinces,
Saskatchewan ranks sixth in size; Texas
is the only American state which exceeds
it in area.

People and Cities. In 1911 the popula-
tion of Saskatchewan was 492,432; in 1921,
it was 757,510. The average density per
square mile for the province as a whole is
over 3, but this figure is misleading un-
less one takes into consideration the fact
that the northern part is as yet unsettled.
The proportion of town and city dwellers
to those who live on farms is about one
to two and one-half. About fifty per cent
of the inhabitants are of British descent;
the remainder are immigrants from the
United States and various European coun-
tries. Regina is the capital and largest city;
other important cities are Saskatoon, Moose
Jaw and Prince Albert.

Physical Features. North of the interna-
tional boundary and extending to the Sas-
katchewan River there is a rolling prairie

region, diversified occasionally by lakes
and patches of woodland. In the eastern
part of the region are two ranges of hills,
the Beaver and the Touchwood, lying
north of the valley of the Qu' Appelle
River. This river, the Assiniboine, the
Souris and the Saskatchewan drain the
southern part of the province. In the
north there is a great forest belt of
cone-bearing trees; to the south of it,
and occupying the central part of the
Province, is an attractive region of
alternating farm and forest country.
The Churchill River, flowing across
the central region, drains a chain of
beautiful lakes, including Reindeer
and Lac la Rouge. Other lakes of
importance are Athabaska, in the
northwest, Wallaston, in the northeast,
Beaver, near the center, and Big Quill,
in the south.

Saskatchewan has a healthful, bracing
climate. Throughout most of the
province the winters are long and cold,
but in the southeastern corner the
temperature is modified by the warm
Chinook winds (see CHINOOK).

Agriculture. Saskatchewan ranks first
among the provinces in the production
of wheat, oats and flax, and is second
in the production of live stock. Barley
and rye are also cultivated, and
practically all kinds of garden
vegetables are grown. The produc-
tion of field crops (in bushels) for
the year 1923 is shown in the follow-
ing table, the figures being official
estimates:

Wheat	252,622,000
Oats	218,075,000
Barley	19,278,200
Rye	8,582,000
Flax	5,493,800

There are about 456,000 dairy cows
in the province, and the dairy industry
is in a prosperous condition. This
industry is centered chiefly in the
parklike region between the Sas-
katchewan and Churchill rivers.
Creamery butter is produced in
sufficient quantity for export, the
annual output exceeding 8,000,000
pounds. Cheese making is also
developing rapidly. Horses, sheep
and swine are raised in large num-
bers, and the poultry industry is
receiving general attention. At
Saskatoon there is a college of agri-
culture which gives scientific aid to
all branches of farming.

Other Industries. The manufacture
of lumber products, brick making
and flour milling are the chief
branches of manufacturing, but
manufacturing industries have not

SASKATCHEWAN



1, Parliament Building at Regina.
2, Experimental Farm at Indian Head.

3, Threshing Scene.
4-5, Live Stock.

6, Fruits and Vegetables,
7, Grain Elevator.

8. Oat Field.

as yet developed very extensively. The larger towns support a large variety of industrial plants which supply the local demand. Prince Albert is the center of the provincial lumber industry, and Saskatoon has one of



COAT OF ARMS OF SASKATCHEWAN

The British lion, on a gold background, symbolizes the unity of the province with the British Empire. The three stacks of golden wheat, on a green background represent Saskatchewan's position as the premier wheat province of the Dominion.

the largest flour mills in the Dominion. Both Saskatoon and Regina are important distributing centers, and the latter city has the largest trade in agricultural implements of all the Canadian cities. The province is surpassed in mineral production by all of the other organized provinces, yet the value of its annual output was over \$1,200,000 in 1922. Clay suitable for making bricks occurs in many localities, and at Estevan, in the extreme southeast, the clay deposit rests on lignite coal. Estevan is the chief center of coal mining, but other deposits have been discovered west of Saskatoon. Other minerals of importance include gold, silver, petroleum and natural gas.

Transportation. Saskatchewan is traversed from east to west by two great trunk lines—the Canadian Pacific and the Canadian National railways. All of these roads have numerous branches and feeders, and the province as a whole has a railroad mileage of over 6,200. The chief railway centers are Regina and Moose Jaw, in the south, and Saskatoon and Battleford. The latter is in the northern part of the settled portion of the province.

Items of Interest on Saskatchewan

"Saskatchewan" is a Cree Indian word meaning *rapid-flowing river*.

About \$250,000 worth of fish are taken from the lakes of the province each year, whitefish being the most important.

The country north and east of Prince Albert is heavily timbered with tamarack, spruce and jack pine. There are about 9,680 square miles of forest reserves in the province under the Dominion government.

Nearly 13,000 Indians, chiefly Crees, live on government reservations and support themselves.

In Saskatchewan there is a colony of Dukhobors, a religious denomination whose members refuse to perform military service.

The province enacted a prohibition law during the World War.

Questions on Saskatchewan

What is the area of Saskatchewan? Compare it with that of Great Britain and with that of New Brunswick.

Describe the surface of the province. Name the principal rivers.

Compare the wheat crop of Saskatchewan with that of the other provinces.

How does Saskatchewan rank as a producer of oats?

What other crops are of importance?

Where is coal found in Saskatchewan?

What are the principal manufactures?

Where is the provincial university located?

Describe briefly the school system of the province.

What is the total railway mileage?

How many representatives has the province in the House of Commons?

What are the principal cities?

What was the population in 1911?

What would be the population of Saskatchewan if it were as thickly settled as New Brunswick?

What is the extreme length and width of the province?

What is the capital city?

Education. Children are compelled by law to attend the free public schools, which are under the direction of a minister of education. The University of Saskatchewan at Saskatoon is at the head of the school system; normal schools at Regina and Saskatoon are also maintained by the provincial government. The school district is the unit for public education, and the affairs of each district are managed by a local board. There are several colleges in the province under denominational control.

Government. The chief executive officer is the lieutenant-governor, who is appointed by the Governor-General of the Dominion. An executive council, or cabinet, of eight members, at the head of which is the premier, assists the lieutenant-governor, whose term of office is five years. The legislative power is vested in an assembly of sixty-two members. Saskatchewan sends sixteen delegates to the Dominion House of Commons. There is a provincial judiciary composed of a supreme court and district courts. Women enjoy municipal and provincial suffrage.

History. Saskatchewan was organized in 1905 from various districts included in the old North West Territories. Its history as an organized province has been mainly one of peaceful development and prosperity, and it was a loyal supporter of the mother country throughout the World War.

Related Articles. Consult the following titles for additional information:

Assiniboine (river)	North West Territories
Athabaska Lake	Prince Albert
Battleford	Red River Rebellion
Canada (history)	Riel, Louis
Churchill River	Saskatchewan Rebel-
Hudson's Bay	lion
Company	Saskatchewan River
Moose Jaw	Saskatoon

SASKATCHEWAN REBELLION, an uprising of the half-breeds in the Canadian Northwest in 1885, under the leadership of Louis Riel (see RIEL, LOUIS). For the causes leading to this outbreak, see RED RIVER REBELLION. After the Red River Rebellion the *Metis*, or half-breeds, were pacified by being given 248 acres of land each, but as settlers poured into Manitoba, a large number of the *Metis* moved into Saskatchewan, where they were again disturbed by settlers, and especially by the building of the Canadian Pacific Railway. They found that the herds of buffalo, upon which they depended for their meat, would be exterminated, and feared that they would lose their lands, since they had no titles to them. In 1884 they

sent for Riel, who since the Red River Rebellion had been living in the United States, to return and help them maintain their rights. In March, 1885, a provisional government was organized at Saint Laurent, and Riel was chosen president.

Probably the difficulty would have been adjusted without resort to arms had not an encounter taken place at Duck Lake, between some of the Mounted Police and the half-breeds. This was followed by an uprising of the Cree Indians who attacked the settlement at Frog Lake, killed the men and carried away the women and children. The Canadian government at once sent forces under General Middleton to quell the disturbance. The insurgents were defeated at all points. The Cree chiefs surrendered; Riel was taken prisoner, tried and hanged for treason. Since then there has been no trouble.

SASKATCHEWAN RIVER, a river of Canada, which with the Nelson forms the greatest river system entering Hudson Bay, and one of the four great river systems east of the continental divide. The Saskatchewan is formed by two branches often known as the North Saskatchewan and the South Saskatchewan. The north branch rises in the Rocky Mountains, in the west part of Alberta, and the south branch, which is often known in the upper part of its course as the Bow River, rises in the vicinity of Devil's Lake, in western Alberta. After winding courses of 800 to 900 miles, these streams unite in the province of Saskatchewan, and the united stream flows eastward into Lake Winnipeg. From this lake it is generally known as the Nelson (see NELSON RIVER). The length of the united Saskatchewan is about 300 miles, making the entire length from the source of the Bow to the mouth 120 miles. The area of the drainage basin of the Saskatchewan-Nelson system is 370,800 square miles, or about one-tenth the area of the Dominion of Canada. Below Cedar Lake, through which the river flows, navigation is interrupted by rapids, but west of the lake it is navigable for steamers to the junction of the two branches, and smaller boats ascend the stream as far as Edmonton 500 miles farther.

SASKATOON, SASK., the seventeenth city in Canada in size, is located on the Saskatchewan River, and on the Canadian Pacific and the Canadian National railways, 466 miles west of Winnipeg and 335

miles east of Edmonton. Branches of these roads radiate from Saskatoon in all directions, making the city one of the most important railway centers in Western Canada; it controls a business territory of nearly 50,000 square miles. Many large firms of Canada and the United States have established factories and warehouses here. The wholesale trade is conducted by 200 firms and includes the distribution of groceries, provisions, hardware, lumber and agricultural implements. There are manufactories of breakfast foods, flour, tractors and clothing. The city has thirteen banks, a Dominion lands office, a land titles office and a collegiate institute. The University of Saskatchewan and the agricultural college and experimental farm of the province are located here. Population, 1901, 113; in 1921, 25,739.

SASSAFRAS, a tree belonging to the laurel family, widely known for its medicinal properties. In the northern part of the United States it is a shrub or small tree, but in the South it grows to the height of forty-five feet. Its range is from Southern Vermont to Florida. The leaves are oval, two-lobed and three-lobed; the three forms often appearing on the same branch. In the autumn the foliage turns to scarlet and deep yellow. From the bark an aromatic oil is obtained, and the bark itself is steeped to make "sassafras tea," popularly believed to be a blood purifier. The taste of sassafras is bitter and aromatic, and it is sometimes used for flavoring.

SATELLITE, a small planet revolving around a larger one, as the moon revolves around the earth. So far as known there are twenty-nine satellites in the solar systems, distributed as follows: Earth, one; Mars, two; Jupiter, nine; Saturn, ten, and three rings; Uranus, six; Neptune, one. Like planets, satellites shine with light from the sun.

SATIN, a soft, closely woven silk, with a glossy surface. In the manufacture of satin, part of the weft is left beneath the warp, which, presenting a close and smooth surface, acquires, after being passed over heated cylinders, that luster which distinguishes it from other kinds of silks. It is of Chinese origin, but is now made extensively in Europe, Great Britain and the United States. Satin is the term applied to silk material; *sateen*, to woolen, linen and cotton imitations. As in silk, tin is sometimes used as an adulterant.

SATIRE, the name given a poem in which people and events are ridiculed. It originated with the Roman writer Lucilius, and it was developed by Horace and Juvenal. Satire may also take the form of epistles, tales, dialogues, songs or fables. Swift's *Gulliver's Travels* is one of the greatest satires ever written. Among English poems, Dryden's *Absalom and Achitophel* and Pope's *Dunciad* are the most celebrated. Lowell's *Biglow Papers*, a series of poems, is the most noted satire in American literature.

SATURDAY, the seventh day of the week, named for the Roman deity Saturn. Saturday is the Sabbath of the Jews and of the Seventh Day Adventists.

SATURN, in classical mythology, an early god, the husband of Rhea and father of Jupiter, Neptune, Pluto, Juno, Vesta and Ceres. He deposed his own father, Uranus, and ruled in his stead. Fearing a prophecy that he in his turn would be dethroned by his son, he swallowed his children as soon as they were born. Jupiter alone was saved by a stratagem of his mother. He deposed Uranus and compelled him to disgorge the five children whom he had swallowed. Saturn then withdrew to Italy, where he founded a prosperous kingdom, and his reign was known as the Golden Age. In art Saturn is represented as Father Time.

SATURN, a planet of the solar system, in position sixth from the sun, which is about 886,000,000 miles distant from it. It is about 70,000 miles in diameter, being second in size to Jupiter. The surface area is about ninety times that of the earth, but Saturn is only about one-eighth as dense as our planet. It rotates upon its axis in about ten hours, and makes a revolution around the sun in twenty-nine and a half earth years. The planet is surrounded by a system of flat rings composed of meteoric particles that produce a gauzy effect resembling dust in a ray of sunlight. The band of concentric rings is about 10,000 miles wide and 100 miles thick. The diameter of the outer ring is about 173,000 miles. Saturn has also ten satellites, the largest of which is Titan, about 3,000 or 4,000 miles in diameter. Seen with the unaided eye, Saturn is a bright star, with a slightly reddish tint. Like Jupiter, it is a gaseous body, surrounded by a very dense atmosphere. It is best seen in late summer and early autumn in the eastern or southeastern sky, moving south as the evening advances.

SATURNALIA, a festival held by the Romans in honor of Saturn, during which the citizens, with their slaves, gave themselves up to unrestrained freedom and mirth. It lasted under the Caesars, seven days, namely, from the seventeenth to the twenty-third of December. During its continuance no public business could be transacted, the law courts were closed, the schools kept holiday and slaves were free from restraint. Masters and slaves even changed places, so that while the servants sat at table, they were waited on by their masters and their guests. The last days of the festival were spent in visiting and giving presents. Little clay images called *sigillaria* were the principal gifts.

SATYRS, *sat'ers*, in Greek mythology, a class of woodland divinities, in later times inseparably connected with the worship of Bacchus. The satyr appears in works of art as half man and half goat, having horns on the head and a hairy body, with the feet and tail of a goat. Satyrs are described as being fond of wine and of every kind of sensual gratification. Pan was the chief of the satyrs, and one of the most famous specimens of Greek art is the Satyr of Praxiteles.

Related Articles. Consult the following titles for additional information:

Fauns	Pan
Mythology	Silenus

SAUL, the first king of Israel, who reigned from about 1095 to 1056 B. C. He was inducted into his office by Samuel, the last judge of Israel. During his reign he united the tribes and gained several victories over the Philistines, Edomites and other hostile nations. He was self-willed, and the last years of his reign were clouded by a quarrel with David, of whom he became insanely jealous. His history is told in *I Samuel*. See, also, **BIBLE**, subhead *Bible Stories*.

SAULT SAINTE MARIE, *soo saint ma re'*, or (French) *so saNt ma re'*, ONT., on the Saint Mary's River and on the Canadian Pacific, the Algoma Central and the Hudson Bay railroads. There is steamship connection with all lake ports, through the great Sault Sainte Marie Canal (which see). The place is connected with Sault Sainte Marie, Mich., on the opposite side of the river, by a railway bridge one mile long. The town has large power plants, important ore and paper mills, foundries and other manufacturing. In the neighborhood are mines of iron, copper and silver, and there is a flourishing lumber industry. In 1917 the city

annexed Steelton. A new power canal which cost \$1,000,000, developing 28,000 horse power, was completed in 1918. Population, 1921, 21,092.

SAULT SAINTE MARIE, MICH., popularly called "the Soo," the county seat of Chippewa County, 350 miles nearly north of Detroit, on Saint Mary's River and on the Duluth, South Shore & Atlantic, the Canadian Pacific and the Minneapolis, Saint Paul & Sault Ste. Marie railroads, and on the Sault Sainte Marie Canal (which see), connecting Lake Superior with Lake Huron. The largest inland commerce in the world passes through the canal. The falls in the river have been utilized in the development of very extensive electrical power. Connection with the Canadian city of the same name is by a great bridge a mile long. The industrial establishments are fish-packing houses, lumber mills, leather, carbide and woolen mills, paper mills and other factories. The city has a Carnegie Library, a hospital and a Federal building. The first permanent settlement within the present state of Michigan was made here by Father Marquette in 1662. Population, 1910, 12,615; in 1920, 12,096.

SAULT SAINTE MARIE CANAL, also called **SAINT MARY'S CANAL**, the canal around the rapids in the Saint Mary's River at the outlet of Lake Superior. There are really five canals—one on the Canadian side and four on the American side of the river. Measured by the traffic, the Sault Sainte Marie is the most important canal in the world. It has a length of one and one-half miles and a drop of eighteen feet.

The first canal was built by the state of Michigan in 1855, and was reconstructed by the United States in 1881. This was the first of the modern locks, and is known as the Weitzel lock; it is 515 feet long, eighty feet wide, and has seventeen feet of water on its mitre sills. The Poe lock, completed in 1896, is 800 feet long, 100 feet wide, and has twenty-two feet of water on its sills. At the time of its completion, this was the largest lock in the world. Meanwhile, the Canadian government completed a lock on the north side of the river, 900 feet long, 150 feet wide and twenty-three feet deep. But the increase in lake traffic called for still greater canal facilities, and in 1908 the United States ordered the construction of the Davis lock, north of the Poe lock. This was com-

pleted in 1914; it is 1,350 feet long, eighty feet wide and twenty-four and one-fourth feet deep. In 1912, while the Davis lock was under construction, Congress ordered another lock of the same size and parallel to it. This fourth lock was completed in 1918.

SAUSAGE, *saw'sayj*, a food consisting of finely-chopped meat mixed with potato flour and seasoned with salt and spices. Sausage of the packing houses is made chiefly of trimmings, particularly those of the head and hoof, and its manufacture is one of the most



SAULT STE. MARIE CANAL

1. Weitzel Lock
2. Poe Lock

3. New Third Lock
4. New Fourth Lock

5. Canadian Lock
6. Power Canal

These locks can accommodate two of the largest lake steamers at once, and can be filled or emptied in six minutes. During the season of navigation there is scarcely an interval of ten minutes, day or night, when there are not boats in one or more of these canals. During the season of 1917, a period of 237 days, 19,569 steamships, 1,943 sailing vessels and 1,373 unregistered vessels passed through the canal. During the season of 1916 the number of steamers was 21,606, and of sailing vessels, 2,421. Close to 100,000,000 tons of freight pass every year through the Canal. See CANAL.

SAUNDERS, MARGARET MARSHALL (1861-), author, was born at Milton, Nova Scotia. Miss Saunders has traveled extensively and takes an active part in philanthropic work. Her best known book is *Beautiful Joe*, which has been translated into many foreign languages. Among her other books for children are *Charles and his Lamb*, *Tilda Jane*, *Beautiful Joe's Paradise*, *Nita*, *The Story of an Eskimo Dog*, *Princess Sukey* and *My Pets*. Her stories are remarkable for their sympathetic treatment of dumb animals.

profitable branches of meat-packing. The work is all done by machinery. After the meat is chopped it is mixed with an equal part of potato flour, and enough water is added to allow the mixture to be easily worked. Sage, pepper, ginger and mustard are the spices generally used. Salt is added to suit the taste, and most of the sausage is packed in casings made of the intestines of the slaughtered animals. As the casings are filled, they are divided into links, hence the name "link sausage." Home-made sausage is made wholly of meat.

There are numerous varieties of sausage, the difference between them consisting chiefly in the seasoning and the manner of packing. But in some varieties, such as Bologna, smoked meat is used. Among Europeans the Bologna sausage of Italy and the smoked sausage of Germany are highly esteemed. Besides these varieties, Frankforts and wienerwursts are common in American markets.

SAVANNAH, GA., the county seat of Chatham County, on the Savannah River, fourteen miles from the ocean, 260 miles

southeast of Atlanta and 768 miles by steamer from New York City. It is on the Southern, the Atlantic Coast Line, the Seaboard Air Line, the Central of Georgia, the Savannah & Northwestern and the Savannah & Statesboro railroads. It has sometimes been called "the Forest City," from its ornamental shrubbery and luxuriant shade trees; according to government statistics Savannah has more park space than any other city in the United States, in proportion to size. There is a fine statue to Confederate dead in the Parade Ground, an extension of Forsyth Park.

The city has free kindergartens, several private schools and colleges, public libraries for white and colored people, including a Carnegie Library, and Telfair Art Gallery. There are numerous charitable institutions, including the Savannah and the Saint Joseph's hospitals, the Georgia infirmary for colored people, the Episcopal orphans' home, Oglethorpe Sanitarium and Telfair Hospital for women. There are many churches, some in the old colonial style of architecture. On the site of Christ Church, John Wesley founded the first Sunday school in America. Other prominent buildings are a courthouse; a Federal building; a union passenger station; Hodgson Hall, containing the library and collection of the Georgia Historical Society; and numerous business buildings ranging from eight to fifteen stories.

The surrounding country produces rice, cotton, sugar cane, vegetables and fruits, and truck gardening is very extensively carried on near the city. The manufacturing industry is of recent development, but of very rapid growth. The products now include fertilizers, lumber and its products, car wheels, shirts and overalls, tin cans, cottonseed oil, crates and boxes, candy, brooms, baking powder, cigars, ice, sash and blinds. The city has a very large trade, both coastwise and foreign, and exports cotton, rosin, spirits of turpentine, lumber and timber, phosphate rock, fruits, vegetables and various manufactured goods. There are excellent terminal facilities for freight handling.

Savannah was settled in 1733 by a small company under the leadership of Gen. James Edward Oglethorpe. During the Revolution the town was fortified by the Americans, but was captured by the British in 1778 and held until the end of the war. It was chartered as a city in 1789. The first steamship which

crossed the Atlantic set sail from here, was owned by Savannah people and was called the *Savannah*. At the time of the Civil War the city had about 25,000 people. It was the end of General Sherman's famous march to the sea and was surrendered after a brief defense and the destruction of the navy yard (Dec. 21, 1864). Since 1900 the boundaries of the city have been extended, bringing within the city limits several suburbs. Population, 1910, 65,064; in 1920, 83,252 (Federal census), of which over one-third is colored.

SAVANNAH RIVER, a river 550 miles in length, formed in South Carolina by the union of the Tugaloo and the Kiowee. It flows in a southeast direction into the Atlantic Ocean, forming a part of the boundary between Georgia and South Carolina. It is navigable for large steamers as far as Savannah and for smaller steamers to Augusta, about 230 miles, while the smallest crafts ascend for 150 miles farther inland.



SAVINGS BANKS, institutions organized for the accumulation and use of small sums of money. They originated about the middle of the eighteenth century, though they had been suggested at an earlier date. The first bank of the kind was established at Brunswick, Germany, in 1765. The chief purpose of such institutions was originally, and has continued to be, the providing of facilities for the safe keeping of small savings, which the larger banks could not profitably handle.

The first savings bank established in the United States was the Philadelphia Saving Fund Society, which was founded in 1816 and chartered in 1819. Others soon arose, and their number has rapidly increased.

There are two classes of savings banks in the United States. These are *mutual* banks, which are owned by the depositors, and *stock* banks, owned by the stockholders. The minimum rate of interest and the nature of the investments which both classes are allowed to make are regulated by state laws. While these banks have more than 11,000,000 depositors and care for over \$5,000,000,000, the greater part of the savings funds are cared for by the savings departments of the regular banks.

Postal Savings Banks. The first postal savings banks were established in England in 1861. Other European countries soon followed England's example, but in the United States such banks were not established until 1910.

Anyone ten years of age or over can open an account in a postal savings bank in his or her own name on depositing one dollar, or any multiple of that sum, provided that not more than \$100 be deposited by the same person within one month. Those who wish to begin saving with sums less than one dollar have the privilege of purchasing special savings bank stamps at ten cents each. The first purchase is a ten-cent card, and to this the stamps are attached until their value reaches one dollar, when the card may be canceled and an account be opened. Funds may be withdrawn at any time. Interest is computed only on even years and on even dollars. No depositor can have over \$1,000 to his credit. When his deposits reach this amount, he can convert his deposit into government bonds paying the same rate of interest, if he so desires, and at any time, by notifying the secretary of the treasury, a depositor can convert his funds into such bonds in sums as low as \$20. Since the establishing of these banks millions of dollars before hidden away for safe keeping have been deposited with the government, and have found their way into the channels of trade. In 1916 the postal savings banks law was extended to Alaska, and within five years the savings there amounted to \$783,851. The five leading states in deposits in 1922 were:

New York	\$61,341,792
Pennsylvania	11,947,839
Illinois	8,551,447
Massachusetts	8,371,412
Washington	7,312,298

School Savings Banks. School savings banks have been in existence in Europe for more than a century. They were established in the United States in 1885. The customary plan is for the school to receive the savings of the pupils and place the total sum in a savings bank. When a pupil's savings amount to one dollar an individual account is opened for him. Money cannot be withdrawn except with the written consent of the parent or guardian. Millions of dollars have been saved by pupils in the public schools since the opening of these banks. Such institutions have been established in Canada since 1906.

SAVINGS BANKS, CANADIAN. Since Confederation the Canadian government has conducted two kinds of savings banks. The first of these, known as the Dominion government savings bank, was established by the Maritime Provinces and was assumed by the Dominion after Confederation. As far as possible the accounts in these banks have been transferred to the postoffice savings banks. This postal savings system is nothing more or less than a national savings bank conducted by the postoffice department. Money is deposited just as in any bank and interest at three per cent is paid on deposits. Any person may have a deposit account—the accounts of children, however, are protected by special regulations. The total deposits made by an individual in each fiscal year (ending June 30) may not exceed \$1,500 and the total balance, exclusive of interest, to the credit of any account is limited to \$5,000.

A depositor in any of the savings bank postoffices may continue his deposits at any other such offices and he may withdraw money at that office which is most convenient to him. For instance, if he makes his first deposit at the savings bank at Regina, he may make further deposits at, or withdraw his money through, the postoffice at Banff, Winnipeg or any place that may be convenient to him, whether he still lives at Regina or has removed elsewhere. In 1923 deposits in the government savings banks were \$9,433,000, and in the postoffice savings banks, over \$22,000,000.

There is a third class of government savings bank; this is known as the "school savings" or "penny savings" bank. The Penny Bank of Toronto, now known as the Penny Bank of Ontario, was the first one to be founded. It has a charter from the Dominion government, granting the right to receive school savings from any part of the Dominion. These savings, according to statute, must be deposited with the government.

SAVONAROLA, *sav o na ro'la*, GIROLAMO (1452-1498), a noted Italian reformer, was born at Ferrara. At an early age he joined the Dominican Order and entered their convent at Bologna, where he became professor of philosophy and theology. He began preaching in 1482 at Ferrara, but soon went to Florence, where, in 1491, he was elected prior of Saint Mark's. Having persuaded himself that he was prophetically inspired, he assumed to foretell impending calamities. He

was intensely enthusiastic and earnest in his efforts to reform the very lax morals of the period.

Feeling that the Church required purification, he fearlessly assailed Alexander VII, who was then pontiff. In 1494, when Charles VIII invaded Italy, Savonarola went to him and by the religious fervor of his appeal had Florence spared from invasion. He took a prominent part in framing the constitution of the Florentine Republic and opposed the pretensions of the Medici



SAVONAROLA

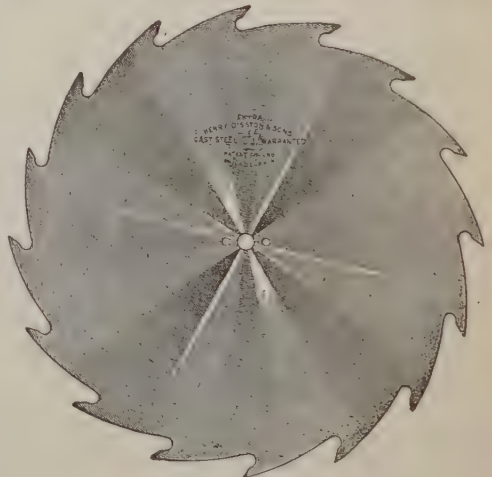
to regain the dominion of Florence, proclaiming death for those who conspired against the Republic. The Medici had strong influence at the Vatican, and used it against Savonarola. Although he continued his clerical duties for a time, he soon lost his hold upon the people of Florence. On April 9, 1498, he and two of his associates were thrown into prison. Six weeks after their arrest they were executed. In the interval between his condemnation and death, Savonarola devoted himself to prayerful preparation. Savonarola's writings consisted of sermons, theological works and a treatise on the government of Florence.

SAVOY, HOUSE OF, the oldest reigning European dynasty, now the ruling house of the kingdom of Italy. Its members are descendants of Humbert, first Count of Savoy, who lived between 1003 and 1056. Since 1416 they have been dukes of Savoy, kings of Sardinia since 1720, and kings of Italy since 1861. For history of the dynasty, see ITALY, subhead *History*.

SAW, a tool made of a thin band or disk of steel, and used in cutting wood, stone, ivory and metals. One edge of the saw is cut into teeth. The shape of the teeth divides saws into two classes, crosscut and rip, and each class has many sizes and shapes. The *crosscut saw* has teeth for cutting across the fiber of the wood. They are triangular and are sharpened on both sides, coming to a sharp point. The *rip saw* is designed for cutting lengthwise the fiber, and the teeth have one edge vertical to the edge of the saw and the other slanting. They are sharpened

so as to have an edge like a chisel. In all saws, the points of the teeth are bent slightly outward so that the portion of wood, or *kerf*, cut by the saw will be a little wider than the thickness of the blade.

Circular saws are found in sawmills, where they cut most of the lumber prepared for market, and in wood-working factories. Some of these saws in lumber mills are seven feet in diameter. They are operated by water, steam or electric power, and will cut 200 feet of wood, board measure, per minute. A *band saw* consists of a band of steel with teeth on one edge, and stretched over two pulleys like a belt. Band saws are used for cutting barrel staves and thin parts of furniture. *Gang saws* are straight saws set in a frame that has an up and down motion. They are used in large sawmills. The distance between the saws is equal to the thickness of the lumber desired. One of these gangs will saw an entire log into boards



A CIRCULAR SAW

Rip saw used in a machine saw.

in the time that a single upright saw would cut one board. The crosscut saw is a thin band of steel with a handle at each end for the workmen to grasp. It is used in felling trees and sawing logs. *Meat saws* have a thin, narrow blade fastened to an iron frame; the teeth are fine. Saws for cutting metal are of a similar design. The blades are tempered so that they are very hard.

SAWFISH, a fish of the ray family whose chief characteristic is the possession of long swordlike snout, with spines projecting like teeth on both edges, forming the "saw." It

is a large fish, and specimens taken off the Atlantic coast of the United States have measured fifteen feet in length. The saw is some-



SAW FISH

Under surface of head of fish.

times six or seven feet long and a foot wide at the base. It is a powerful weapon and the fish uses it to tear open the bodies of its victims. The mouth on the under surface of the head has rough, flat teeth, used for crushing the food.

SAW FLY, a large family of insects, so called because the female is armed with a number of sawlike organs with which she perforates the stalks and other parts of plants for depositing her eggs. The fluid injected into the perforation causes a gall-like swelling, where the larva lives. Different species infest different plants, and the larvae are destructive in different ways; though they may practically disappear for several years at a time, they again become very numerous and do much damage to wheat, turnips, currants and other crops.

SAXE, *sax*, JOHN GODFREY (1816-1887), an American humorous poet, journalist and lecturer, born at Highgate, Vt. He practiced law for a time, but abandoned this for a literary career. His claim to fame rests upon his humorous poems included in *Progress*, a satirical poem; *The Money King*; *The Flying Dutchman*; *Fables and Legends of Many Countries* and *Leisure-Day Rhymes*.

SAXIFRAGE, the popular name of a genus of plants, many of which grow in stony soil. All species are inhabitants of highland regions of the cold and temperate parts of the northern hemisphere. Most of them have tufted foliage and panicles of white, yellow or red flowers, and many are well known as ornamental plants in gardens. The best known species are the *beefsteak*, or *strawberry*, *geranium*, imported from China; the *golden saxifrage*, and the *swamp saxifrage*.

SAX'ONS, a warlike Germanic people who in the fifth and sixth centuries invaded Britain and laid the foundation for the Saxon kingdom in the island. A part of the people remained on the continent, where they had

spread over what is now Northwestern Germany as far as the Elbe. They were conquered by Charlemagne, who forced them to embrace Christianity. The German state, Saxony, takes its name from the Saxons who originally inhabited that part of Europe.

SAX'ONY, a kingdom of the former German Empire, whose ruler, Friedrich August II, abdicated in November, 1918, at the time of the revolution which overthrew the imperial German government. Thereupon a democratic government was established in Saxony, which became one of the states of the German republic. Saxony is situated in the eastern part of Germany, and is bounded on the southeast and east by Czechoslovakia. Prussia, Reuss, Saxe-Weimar, Saxe-Altenburg and Bavaria are the German states which border upon it. The area is 5,789 square miles, and the population is over 3,000,000. Leipzig, Dresden, Chemnitz and Plauen are the chief cities.

The state is traversed by the Elbe River, and has several ranges of mountains with rich mines of silver, iron, coal and other minerals. About one-fourth of the country is covered with forests. Abundant crops of potatoes and cereals are harvested, and the state is also a prosperous manufacturing region. At Meissen is a state porcelain factory which produces the famous Dresden china; Leipzig is a world center of printing and publishing.

History. The name Saxony was originally given to the country in which the Saxons dwelt. These people were conquered by the Franks in 785 and were completely subjugated within the next twenty years. Later the Saxons and most of their country were incorporated into the empire of Charles the Great. Owing to the attacks by Slavs and Northmen the people organized the country into divisions called *marks*, for the purpose of mutual protection. These were governed by dukes, one of whom, with his descendants, extended his power over the entire region known as Saxony and thus formed the old Saxony duchy. In 919 Henry, the ruler of this duchy, was elected king of Germany and his family ruled the country until 1024. During the Middle Ages the kingdom formed various alliances and was ruled by a number of different families.

At the breaking out of the Reformation the country was ruled by Frederick the Wise, who was an intimate friend of Luther and

who used his influence to establish Protestantism in Saxony and other German countries. In this he was measurably successful, and his son and successor continued the work and finally secured the triumph of Protestantism in Germany; but during the Thirty Years' War Saxony lost its position as the leading Protestant German state. Late in the seventeenth century Frederick Augustus, who was at that time emperor, also became king of Poland and joined Peter the Great and the king of Denmark in an attempt to overthrow the government of Sweden. The failure of this attempt was disastrous to Saxony and left the country nearly bankrupt.

In 1735 Saxony became involved in the War of the Austrian Succession, from which it did not escape without financial disaster. In 1806 the ruler, Frederick Augustus I, became an ally of Napoleon, who in the following year conferred upon him the duchy of Warsaw, but after the overthrow of Napoleon at Leipzig Augustus was deprived of more than half of his kingdom, which was awarded by the Congress of Vienna to Prussia. In 1866 Saxony joined Austria in the Seven Weeks' War and as a result was compelled to become a member of the North German Confederation; in 1871 it became a member of the German Empire. See GERMANY; WORLD WAR.

SAXOPHONE, *sax'ō fohn*, a brass musical instrument invented by Adolph Sax, from whom it takes its name. The saxophone has a deep tone and is used principally in military bands. It consists of a conical tube turned upward at the bottom, and having a small part turned backward at the top. The mouthpiece contains a reed similar to that used in a clarinet. There are twenty keys arranged on the tube, which are played by the first three fingers of each hand.

SCAB, or **SCABIES**, *skā'be eez*. See MANGE.

SCALE, in music a succession of notes arranged in the order of pitch, and comprising those sounds which may occur in a piece of music written in a given key. In its simplest form the scale consists of seven steps or degrees, counted upward in a regular order from a base note (the tonic or keynote), to which series the eighth is added to form the octave. The scale having C for its keynote is the natural, or normal, scale. The *diatonic scale* ascends by five steps (tones) and two half steps (semi-tones), taking for

the names of the notes the syllables do, re, mi, fa, sol, la, ti, do; the two semitones occur between E and F (mi and fa) and B and C (ti and do). When the scale is graduated all the way by a series of twelve half-steps, or semitones, it is called the *chromatic scale*. A scale is said to be *major* when the interval between the keynote and the third above it, as from C to E, consists of two tones; it is called *minor* when the interval between the keynote and its third, as from A to C, consists of a tone and a half. See MUSIC.

SCALE INSECT, or **BARK LOUSE**, one of a large number of different species of insects which attach themselves to all parts of plants, where they remain in order to suck the juices. They are very small and cover themselves with scales, which are either naked or covered with cottony down or hair. Some species are serious pests and affect not only choice garden and hothouse plants, but also the fruit-bearing trees and shrubs. Of the 1,400 or more known species, almost 400 are prevalent in America. An emulsion of kerosene or crude petroleum will usually control the pest when the insects are young. See LAC.

SCALES, thin, flat membranous or horny plates, usually overlapping, which form the covering of certain animals, especially fishes. Some lizards and serpents also are covered with scales, and a few mammals, notably a species of anteater. Scales vary in shape, size and arrangement, according to the genus of animal.

In botany, the word *scale* is applied to small, bracted leaves, scalelike in form, whose function seems to be that of protecting the more delicate plant organs. A common instance is found in the scales which protect the leaf buds during the winter.

SCALLOP, *sko'llup*, the common name of a genus of mollusks related to the oysters. There are numerous species, of which the common and great scallop are the most familiar forms. The latter is esteemed a delicacy in the markets of London. It was a shell of this species that in the Middle Ages was carried in the hats of pilgrims as a token of their pilgrimage to the Holy Land. The shell is somewhat rounded and ends in a triangular ear, in which the hinge is placed. Two species of scallop are found along the Atlantic shores of North America.

SCALP, the outer covering of the top and back part of the skull. It consists of the

skin, which, with the exception of the growth of hair, differs little from ordinary skin; the tendon of the muscle that wrinkles the forehead horizontally and moves the scalp; cellular tissue, and blood vessels. Injuries to the scalp, especially severe burns, often result in erysipelas and inflammation. The word *scalp* is also applied to the circular piece, about four inches in diameter, taken by the Indian from the crown of the head of his victim. In 1755 Massachusetts offered £20 (about \$100) for the scalp of an Indian woman or child and £40 for that of a male. During the Modoc War in 1873 scalps were taken by the troops.

SCAMMONY, *skam'oni*, a climbing, twining plant which grows in abundance through Syria and Asia Minor. It resembles the common bindweed, though larger, and has a stout tap root, from which a common drug is taken. Scammony is blackish-gray, with a nauseous smell and a sharp, bitter taste, and is given in medicine where a strong cathartic is needed.



SCAMMONY

SCANDINAVIA, the name formerly applied to the kingdoms of Norway, Sweden and Denmark or of Norway and Sweden alone, and still frequently used in referring to these countries. It is also the name of the peninsula containing Norway and Sweden. The term now has no political significance. See DENMARK; NORWAY; SWEDEN.

SCAPEGOAT, *skayp'goht*, in the Jewish ritual, a goat which was brought to the door of the tabernacle, where the high priest laid his hands upon him, confessed the sins of the people and transferred them to the head of the goat. The animal was then sent into the wilderness, bearing the iniquities of the people. In modern phraseology the word is used to designate an innocent person who is made to bear the blame of others.

SCAP'ULA. See SKELETON.

SCARAB, *skair'ab*, the sacred beetle of the Egyptians, sometimes called *dung beetle*,

from its habit of enclosing bits of refuse into pellets and using them as food. Scarabs were believed to resemble the shape and



SCARABS

luster of the sun and to symbolize immortality. Figures of it, plain or inscribed with characters, were employed as amulets and seals. Large numbers of these scarabs, made of hard stone or gems, are still to be found in Egypt.

SCARLET FEVER, a very contagious disease that is often fatal and that frequently leaves serious disorders of the system in its train. It begins with something like an ordinary cold, with sore throat, which is, however, followed by a high fever and scarlet eruptions on the body. One variety of the disease is very light, while another is more severe, and in a third form the symptoms increase in violence with great rapidity, and the disease proves fatal within two or three days. In a majority of cases the fever begins to fall after the fifth day, and the recovery thereafter is gradual. Not infrequently death occurs as a result of complications, rather than of the disease itself. Dangerous diseases of the kidneys supervene, and inflammations which may result in deafness and in loss of the power of speech, as well, form often in the throat or in the inner ear. The appearance of kidney complications is usually noticed in that stage of the disease during which the flakes of skin are peeling off, and at this time dropsy is frequent.

A person suffering from scarlet fever is peculiarly liable to the infection of bacterial diseases, and pneumonia and diphtheria frequently follow. Scarlet fever is not strictly a disease of childhood, though comparatively few adults have it. From its seriousness it is evident that each case should be carefully treated and that the patient should also be guarded against cold or infection from any other disease throughout his convalescence. From its peculiar contagiousness, it is evident that each case should be carefully isolated and that thorough disinfection should follow recovery. The germs have been known to remain active in clothing and elsewhere for

a long time. It should be remembered, too, that the contagion is active during that stage of the disease when the body is shedding the poisonous scales. The child should be kept away from others for six or eight weeks, in order that it may be certain that he is not a source of infection.

SCHELDT, *skelt*, a river of Belgium and the Netherlands, 250 miles in length, rising in the French department of Aisne and flowing in a northerly and then northeasterly direction, merging with the Rhine delta and opening into the North Sea. About fifteen miles below Antwerp it divides into the East Scheldt and the West Scheldt, forming a double estuary and enclosing the islands of South Beveland, North Beveland and Walcheren. It is one of the most important waterways of Europe, being navigable by means of a series of locks for 210 miles and connected by canals with the cities of Belgium and France. At Antwerp it has a breadth of 1,600 feet and forms a secure harbor for the largest ships. For 200 years previous to 1863, the Scheldt was in the hands of the Dutch, who levied a toll on all foreign vessels. In 1863 it was made a free waterway by the Treaty of Brussels.

SCHENECTADY, *ske nek'ta di*, N. Y., the county seat of Schenectady County, sixteen miles northwest of Albany, on the Mohawk River, on the New York State Barge Canal and on the New York Central and the Delaware & Hudson railroads, and electric lines. It is an important industrial city, with about 140 manufacturing establishments, producing electrical supplies, clothing, insulators, locomotives, foundry and machine shop products, brooms, brushes and many other goods. Union College is located here. Some of the prominent buildings are a courthouse, a city hall, an opera house, a Y. M. C. A., a Carnegie Library, a Federal building and a high school which cost \$550,000. There are four parks aggregating about 190 acres. Schenectady was settled by Arent Van Corlear in 1662. The French and Indians massacred most of the inhabitants in 1690 and burned a part of the settlement. It was incorporated as a borough in 1765, and was chartered as a city in 1798. Population, 1910, 72,826; in 1920, 88,723, a gain of 22 per cent.

SCHILLER, *shill'ur*, JOHANN FRIEDRICH CHRISTOPH VON (1759-1805), one of the greatest of German dramatists and poets, was born at Marbach, Württemberg. His father

was superintendent of the woods and gardens attached to a residence of the duke of Württemberg, and the duke had the boy educated in a military academy, which he himself had founded at the castle of Solitude.

Here Schiller studied jurisprudence; but when the school was removed to Stuttgart, and its scope became extended, he turned his attention to medicine. In 1780 he was appointed physician to a regiment in Stuttgart, and it was now for the first time that he had enough leisure and freedom to



SCHILLER

finish his tragedy of *The Robbers*, begun three years previously. He published this piece at his own expense in 1781; it attracted an immense amount of attention, and in 1782 it was performed at Mannheim. Arrested for attending the performance without leave of the Duke of Württemberg, and forbidden by the same despotic authority to write plays, Schiller fled from Stuttgart and settled at Mannheim, as poet to the theater. Here the plays of *Fiesco* and *Cabal and Love* were soon afterwards produced.

In 1785 he went to Leipzig and Dresden, where he studied the history of the times of Philip II, to prepare himself not only to write his drama of *Don Carlos*, which appeared in 1787, but also to publish a *History of the Revolt of the Netherlands*. Visiting Weimar in 1787, he received a friendly welcome from Wieland and Herder, and later he made the acquaintance of Goethe, with whom he formed a close friendship. Goethe secured for him a professorship at Jena, and here he lectured on history and published *Historical Memoirs from the Twelfth Century to the Most Recent Times* and his *History of the Thirty Years' War*. It was then, also, that, through the influence of Goethe, he returned with renewed ardor to poetry and produced his finest lyrical poems and ballads. Among these are *The Diver*, *The Cranes of Ibycus*, *The Glove* and *The Song of the Bell*, the finest of German lyrics. It was after 1798 that he published in succession the dramas of *Wallenstein*, *Maria Stuart*, the *Maid of Or-*

leans, the *Bride of Messina* and *William Tell*, this last his greatest work. In 1802 he was raised to the rank of nobility. In German literature Schiller stands second only to Goethe, and his works are perhaps read more than those of Goethe.

SCHILLING, *shil'ing*, JOHANNES (1828-1910), a German sculptor, born at Mittweida, Saxony. He studied art at Berlin, Dresden and Rome, and in 1868 became professor at the Dresden Royal Academy. His chief works include his masterpiece, the *German National Monument*, on the Niederwald, opposite Bingen on the Rhine; the *Four Seasons*, at Dresden; a statue of Schiller, at Vienna; and the *War Memorial*, at Hamburg.

SCHLESWIG - HOLSTEIN, *shlais'viK hole'stine*, the name applied to two provinces lying south of Denmark which were ceded by that country to Austria and Prussia in 1864, and which Prussia seized from Austria in 1866. The territory was incorporated in the German Empire as a province of Prussia in 1871, and remained a part of Germany without division until 1919. According to the peace treaty imposed on Germany by the victorious allies plebiscites (votes) were to be taken in three zones to determine which part of the province should revert to Denmark. The result of the vote was that the northern province was restored to Denmark, and the south part remained in Germany.

The area of Schleswig-Holstein is about 7,340 square miles, or a little less than that of New Jersey. Schleswig is the northern part and Holstein is the southern part. Schleswig-Holstein forms a part of the same peninsula with Jutland, to which, in its general character, it bears considerable resemblance. There are extensive moorlands; the west coast consists of sandy and marshy flats, protected in Schleswig by chains of hills and in Holstein by lofty dikes. The east coast is scooped out into natural harbors. The principal streams flow to the west, toward which for the most part the country slopes in gradual stages.

In the tenth century and the early part of the eleventh century, Schleswig formed part of Germany, but in 1027 it was ceded to Canute of Denmark. In the thirteenth century it was made a duchy, under the control of Denmark, and late in the fourteenth century it came under the control of the count of Holstein. When in 1460, on the extinction of the Holstein dynasty, Schleswig-

Holstein chose Christian I of Denmark as ruler, provision was made that they should never be separated from each other or be incorporated with Denmark. Although thus closely united, the two duchies differed widely from each other, Holstein being almost completely German, and Schleswig, Danish.

A proclamation of the Danish king, issued in 1848, that Schleswig was to be incorporated with Denmark, brought on a rebellion throughout Schleswig-Holstein, which was aided by Prussia and other German states. Denmark was defeated, and in the following year, when hostilities began again, the Danes were a second time driven from Schleswig. In 1851, however, Prussia and Austria again entered the struggle, this time on the side of Denmark, and the result was the suppression of all revolt.

Bismarck in 1864 induced Austria to join with Prussia in an attempt to compel Denmark to withdraw Danish rule from Schleswig-Holstein, and when Denmark refused, open war began. The result was the defeat of the Danes and the cession of Schleswig and Holstein to Austria and Prussia. By a treaty between these two nations, Schleswig was placed under the control of Prussia, while Austria regulated affairs in Holstein. As Bismarck had expected, the differences between Austria and Prussia over the management of the duchies led, in 1866, to war (see SEVEN WEEKS' WAR), the outcome of which was the union of Schleswig-Holstein with Prussia. See GERMANY; WORLD WAR.

SCHLEY, *sly*, WINFIELD SCOTT (1839-1911), an American naval officer, born in Frederick County, Md., and graduated from the United States Naval Academy in 1860. He fought in the Civil War, and afterwards taught in the Naval Academy. His first noteworthy achievement was his rescue of the Arctic explorer Greely. Greely had gone north with his expedition in 1881, and had not been heard from for two years. Schley, then a commander, volunteered his services as head of the relief expedition, which set sail in 1884, found Greely and six of his followers and brought them back. A gold medal was awarded him in recognition of this service, and two years later he was made a captain.

In the course of a command at Valparaiso, Chile, some of his crew were killed by natives, and Schley negotiated a satisfactory settlement with the Chilean government.

After serving several years as lighthouse inspector, he was promoted to the rank of commodore, and in 1898 when war was declared with Spain he was placed in command of the Flying Squadron. In the temporary absence of Rear-Admiral Sampson occurred the Battle of Santiago, and Schley, in command of the blockade, destroyed the Spanish fleet. He was promoted to the rank of rear-admiral.

After the close of the war a number of statements derogatory to Admiral Schley's conduct during the war were made by officers of the navy, and Schley requested the Secretary of the Navy to have these charges investigated. The court criticised Schley's management of the squadron at the beginning of the war, but commended his conduct in the battle with the Spanish fleet, and no further action was taken.

Admiral Schley was a member of the commission which directed the evacuation of Porto Rico. After serving two years as commander of the South Atlantic squadron, he retired.

SCHMALKALDIC, *shmal kah'l'dik*, **LEAGUE**, a league entered into at Schmalkalden in 1531, by several Protestant princes and free cities, in common defense of their faith and political independence against Emperor Charles V and the Roman Catholic states. Among the organizers were the elector of Saxony; his son, John Frederick, and Philip of Hesse. The rulers of Saxony were empowered to manage its affairs. In the war of the Schmalkaldic League against Charles V (1546-1547), Charles was at first successful. In his victories he was aided by Maurice of Saxony, who had been a member of the Schmalkaldic League, but who, tempted by the promise of the electorate of Saxony, had gone over to the side of the Emperor. At Mühlberg (1547), the Protestant forces were totally routed, and both the elector and Philip of Hesse fell captive to the Emperor. At this juncture, however, Maurice returned to his former allegiance and organized a revolt. Making an alliance with Henry II of France,



WINFIELD SCOTT
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he led the League again into the field and by several successive victories forced the emperor to grant the Treaty of Passau, in 1552, guaranteeing absolute freedom of worship to the Protestants. See REFORMATION, THE.

SCHOFIELD, *sko'feeld*, JOHN MCALLISTER (1831-1906), an American soldier, born in Chautauqua County, N. Y. After graduation from West Point he taught there and at Washington University, Saint Louis, Mo., and at the outbreak of the Civil War entered the Union service as major of the First Missouri Volunteers. Later in the year he was appointed brigadier-general, and afterwards was placed in command of the Missouri militia. The following year he was made major-general of volunteers and rendered conspicuous service to the Union in Sherman's Georgia campaign and in the Battle of Franklin. He was active in the campaign against Hood in Tennessee and later captured Wilmington, N. C. In 1868 he was appointed Secretary of War to succeed Edwin M. Stanton; in 1869 was made major-general of the United States army, later was appointed general in chief, and was made lieutenant-general by President Cleveland in 1895, but retired the same year. He wrote *Forty-Six Years in the Army*.

SCHOLASTICISM, *sko la'sti siz'm*, the philosophy taught by the teachers of the Middle Ages, who were called Scholastics, or Schoolmen, because their philosophy originated in schools established by Charlemagne and others for the education of the clergy. Scholasticism attempted to harmonize the tenets of the Church with the logic of Aristotle, just restored to Europe by the Saracens. Among the most distinguished of the thirteenth-century exponents of scholasticism were Albertus Magnus, Roger Bacon, Duns Scotus and Saint Thomas Aquinas. The movement awakened the mental life of Europe and prepared the way for the Renaissance.

Related Articles. Consult the following titles for additional information:

Aquinas, Saint	Duns Scotus
Thomas	Renaissance
Bacon, Roger	

SCHOOL DISTRICT, the smallest political division for any governmental purpose, except some city wards. It is a political section devoted wholly to education, and in rural communities is usually two miles square. It approaches closer than any other unit to a pure democracy, for all adult residents are

qualified to participate in its annual meeting. The officers of a school district are called trustees, are usually three in number, and one is elected each year.

Some children in studying geography may well begin with the school district, because it is small and the facts respecting it can be readily comprehended. The outline for study may be somewhat like that given below:

The School District

- (a) Political features
 - (1) Map
 - (2) Location in township
 - (3) Numbers or names of surrounding districts
 - (4) Area (sections included)
 - (5) Roads
 - (6) Population
 - (7) School population
- (b) Physical features
 - (1) Rivers
 - (2) Creeks
 - (3) Valleys
 - (4) Plains
 - (5) Hills or mountains
 - (6) Swamps

SCHOOL GARDEN. The school garden movement is international in scope. In Europe the cultivation of small plots of ground by pupils has long been an established feature of the school systems, and within recent years the idea has found widespread favor in both the United States and Canada. In the former country the Bureau of Education in 1914 inaugurated a plan of school-directed gardening that proved very successful. The plan consisted in enlisting boys and girls of elementary school age in systematic garden work on available ground in backyards, vacant lots or school yards. Teacher directors were appointed to supervise the work, and parents were urged to coöperate with the young gardeners in every way possible. In March, 1918, the name United States School Garden Army was adopted, and a special campaign for enlistments was begun. By May, 1919, 3,000,000 school boys and girls had joined the army. The following suggestions on plans of organization have been published:

Number of members in a company: Ten to 150.

Age limit: Any school child, but preferably the more important companies should be enlisted from the pupils above the third grade.

Requirements for enlistment: The signing of an obligation card in which the pupil agrees to raise one or more food crops and to keep records of his work and the results, reporting them to the teacher or garden supervisor. These cards will be furnished by the Bureau of Education.

Officers: Each company to have a captain and one or two lieutenants, the latter depending upon the number of soldiers enlisted.

Insignia: For the privates, a service bar with U. S. S. G. in red letters on a white background, with a border of blue. For the second-lieutenant, the same bar with one white star in the border. For the first-lieutenant, the same bar with two white stars in the border. For the captain, the same bar with three white stars in the border. For the garden teacher or supervisor, similar insignia without stars, with blue letters and a red border.

Enlistment of existing organizations: Any organization of school children now doing garden work will be eligible to enlistment. Such organizations may keep their existing form, if they so desire, and have the additional impetus of belonging to a national army fostered by the President, the Secretary of Interior and the Commissioner of Education. The aim of this army is to nationalize and unify the great work now being carried on among school children of America.

From the standpoints of health, economics and education, school gardening has much to commend it. It has been estimated that 5,000,000 boys and girls can produce in a season \$250,000,000 worth of food, an important fact in view of destitute conditions in many parts of the world following the World War. Transportation congestion is also relieved through the consumption of products raised in the community. The young gardeners themselves are taught valuable lessons of thrift and economy, they gain practical experience in agriculture, and they learn many important facts in botany and zoölogy. Moreover, the work itself is healthful and invigorating, and it brings the pupils close to the heart of the great teacher—Mother Nature.

See Boys' and Girls' Clubs; Gardening. For further information write to the Director of the School Garden Army, Washington, D. C.

SCHOOL SAVINGS BANKS. See SAVINGS BANKS.

SCHOOLS. In its broadest sense, the term *school* is used to designate a place where instruction is given in the arts, sciences, professions and ordinary vocations, and includes grammar schools, vocational schools, evening schools, high schools, academies, colleges, universities and technical schools. Most commonly, however, the name is restricted to institutions below college rank. The founders of America realized that the state must rely upon an educated citizenship for its continued existence. The only clause of the famous Ordinance of 1787 that is now remembered is the following:

Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged.

In pursuance of this policy the states erected out of this vast territory, and those from other territory as well, have organized and maintained an excellent system of public schools.

Schools, Consolidated. In many sections the one-room rural school is at a great disadvantage because of the small number of pupils and lack of adequate funds for its support. Because of these disadvantages many families send their children to some near-by town where they can have the advantages of a graded school. Many of these children acquire a liking for town life, and when grown up they depart for the city.

To meet the demand of rural communities for schools equal to those in the towns, the plan of consolidating a number of adjoining school districts with small schools into a single district, and establishing one school with enough pupils and money to make it equal to the town school in equipment and efficiency, has been successfully carried out.

Many states now have laws providing for the consolidation of rural schools, and these laws make provision for transporting the pupils to and from school at the districts' expense. In many places graded schools have been established, and schoolhouses equipped for domestic science and manual training have been erected. Moreover, these schoolhouses contain assembly rooms where lectures and other entertainments are given, and the schoolhouse becomes the community center for many activities that enrich rural life.

Correspondence Schools, educational institutions in which instruction is given to pupils by mail. This system of education is the result of a general demand for the extension of higher instruction to many persons who are unable to attend high schools, normal schools or colleges. It is especially intended for students of small means, who are prevented by financial or other considerations from continuing their studies beyond grammar school or high school courses. By means of the correspondence school a person employed may continue his studies, or pursue a course of training that will prepare him for a different vocation. Many men and women holding positions of responsibility owe their advancement to the training they received

through a reputable correspondence school.

The movement which gave correspondence schools a sanction in the United States was inaugurated in 1895 by President William R. Harper, of the University of Chicago. Dr. Harper declared that he could teach Sanskrit by mail as effectively as in the classroom. Later the university established a correspondence department, in which a student can take a part of any course by correspondence and receive credits for the work completed, but he must complete his course at the university. Following the example of the University of Chicago, other universities established correspondence departments, and the University of Wisconsin has extended its field to cover practically every occupation and the educational needs of any citizen in the state.

While instruction by correspondence may be given in nearly all lines of study, it is most successful when applied to industrial subjects, and by far the largest number of correspondence students are pursuing subjects pertaining to some line of industry.

Secondary Schools, schools ranking in grade between the common schools and the colleges. In the United States they include high schools, academies, and seminaries whose courses of study do not extend beyond preparation for college. The high schools are under city or township control, and in the newer states the most advanced are affiliated with state universities, so that their graduates can enter those institutions without examination (see HIGH SCHOOL). Academies and seminaries are usually under denominational control. Many of these schools maintain, in addition to a college preparatory course, departments in commerce and finance, art and music. The secondary schools of Germany are known as *realschulen*.

Related Articles. A complete list of the topics connected with the subject will be found at the end of the article EDUCATION. See also, HIGH SCHOOLS.

SCHOOLS, MILITARY. See MILITARY SCHOOLS.

SCHOPENHAUER, *sho'pen how er*, ARTHUR (1788-1860), one of the foremost philosophers of the nineteenth century, who originated a system which has become the classic of philosophical pessimism. Taking Kant as his point of philosophical departure, he attempted to reconcile the two contradictory elements in Kant's system—idealism and realism—by defining Kant's "thing-in-

itself" as *will* and regarding it as the "only necessary reality in the universe." By "will" he means not conscious choice, but blind, unconscious force which aims at no rational end. He holds that there is no ground for hope that things will be better; therefore it is the highest wisdom to adopt an attitude of resignation—to relinquish all desire, all aspiration and passively acquiesce to inevitable circumstance. The position is closely akin to the ancient Hindu idea of Nirvana (see **BUDDHISM**).

Schopenhauer was born at Danzig, Prussia, the son of a wealthy banker, and was educated at the universities of Göttingen and Jena. Between 1814 and 1818 he lived at Dresden and there wrote his celebrated work, *The World as Will and Idea*. After travels in Italy he went to Berlin in 1820, and there attempted to lecture in competition with Hegel, who was then a favorite. Failing to gain coveted recognition, he retired in morose disappointment to his home at Frankfurt-on-the-Main, and there, except for short intervals, spent the rest of his life.

SCHUBERT, *shoo'burt*, FRANZ (1797–1828), one of the great masters of music, possibly the greatest song-writer who ever lived. He was born at Vienna, of a musical family, from whom he learned the rudiments of violin and piano playing. His mastery of music came, however, chiefly through independent study of the masterpieces and through association with a brilliant group of fellow musicians. Schubert's was a radiant personality; he was blessed with a large circle of loyal friends, and these constituted almost the only external compensation in a life of terrible drudgery, poverty and cruel disappointments. Lack of proper recognition for his work reduced him to the necessity of teaching school. Composing was done in spare moments and in feverish haste.

No other composer has been known to work with sustained effort at such incredible speed. In the course of his short life he produced more than six hundred songs, including the immortal *Erkling*, the popular *Hark, Hark the Lark*, and *Who Is Sylvia*, *Wanderer* and

Serenade; ten symphonies; fifteen operas besides a large number of miscellaneous works for violin, piano or voice. His *Symphony in C Major* and *Unfinished Symphony* are among the imperishable masterpieces of music.

Liszt called Schubert the most poetic musician that ever lived; and Schumann said, "He has strains for the most subtle thoughts and feelings."

SCHUMANN, *shoo'mahn*, ROBERT (1810–1856), a celebrated German composer of songs and a pianist and musical critic, was born at Zwickau, Saxony. He studied law at Leipzig, but after 1830 devoted himself entirely to music. A noted pianist, Clara Wieck, daughter of his teacher, became his wife in 1840. In 1834 he founded the *Neue Zeitschrift für Musik*, a journal which for ten years exercised an important influence upon the development of music, giving loyal support to Chopin, Brahms, Berlioz, Schubert, Mendelssohn and other rising musicians. In the year following his marriage, Schumann wrote some of his finest songs and his first symphony. During a residence in Dresden, 1840 to 1844, he composed the cantata *Paradise and the Peri* and a quintet for the piano, and began his composition of the music for Goethe's *Faust*.

In 1850 the Schumanns moved to Düsseldorf, where, under stress of work, his mind failed him, and he died in a private asylum for the insane. Schumann ranks with Schubert as a composer of songs and with Chopin and Liszt as a master of piano technique. Many of his songs were written to poems of Goethe, Heine, Byron, Moore and others. An edition of his complete works, edited by his wife, includes thirty-four volumes.

SCHUMANN-HEINK, *hynke*, ERNESTINE (née ROESSLER) (1861–), one of the foremost of German contraltos, was born near Prague, Bohemia, and educated in that city. At the age of seventeen she made her début at Dresden as Azucena in *Il Trovatore*, and for several years continued to sing in opera and concert. She was married in 1882 to a Mr. Heink, and ten years later to Paul Schumann. In 1905 she was married to William Rapp, Jr., from whom she was divorced in 1915. Madame Schumann-Heink made her first American appearance in 1898 as a member of the Metropolitan Grand Opera Company, New York. She has since appeared innumerable times in cities

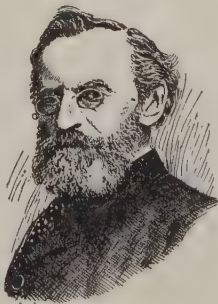


SCHUBERT

throughout the United States before enthusiastic opera and concert audiences. She has been acknowledged one of the foremost singers of German *lieder* and interpreters of Wagner rôles.

SCHURMAN, *shoor'man*, JACOB GOULD (1854-), president of Cornell University. He was born at Freetown, Prince Edward Island. He won the Canadian Gilchrist scholarship and was graduated from the University of London; later he attended the Universities of Edinburgh, Heidelberg, Berlin and Göttingen. He became successively professor of philosophy in Acadia College and Dalhousie College, Sage professor of philosophy at Cornell, and in 1892 president of Cornell University. He was appointed chairman of the first United States Philippine Commission in 1899; in 1912 and 1913 was minister to Greece, and in 1921 was appointed minister to China by President Harding. He is the author of *Kantian Ethics and the Ethics of Evolution*, *Belief in God*, *Agnosticism and Religion*, *A Generation at Cornell*, *Philippine Affairs, a Retrospect and Outlook*, *The Balkan Wars and Why America is in the War* (1917).

SCHURZ, *shoorts*, CARL (1829-1906), a prominent American orator and political leader, born at Liblar, Prussia, and educated at the universities of Cologne and Bonn. His liberal ideas forced him to quit Germany in 1848, and he acted as a newspaper correspondent from Paris and London. In 1852 he emigrated to the United States and settled in Watertown, Wis. In 1857 he was an unsuccessful Republican candidate for lieutenant - governor and two years later he began to practice law in Milwaukee. He was made brigadier-general in the Federal army in 1862 and fought at Bull Run, Chancellorsville, Gettysburg and Chattanooga. After the war he became a newspaper correspondent, and finally editor of the Saint Louis *Westliche Post*. In 1869 Schurz was elected to the United States Senate. He was appointed by President Hayes as Secretary of the Interior, and at the close of the administration he became editor of the New York *Evening*



CARL SCHURZ

Post. He was president of the National Civil Service Reform League from 1892 to 1901.

SCHUYLER, *ski'ler*, PHILIP (1733-1804), an American statesman and general of the Revolutionary war, was born at Albany, N. Y. He served with great credit in the French and Indian War, and was elected a delegate to the Continental Congress in 1775. Soon after the Battle of Bunker Hill he was appointed major-general in the Continental army, in command of the Northern New York division. Later he fought against Indians and Tories in New York and made a treaty of alliance with the Six Nations. Hampered and accused by superior officers, he resigned his commission, demanded a court of inquiry, and was acquitted with honor. He remained in the army, but was superseded by General Gates. To Schuyler, however, belongs the credit for Burgoyne's surrender (see SARATOGA, BATTLES OF). Schuyler was later elected to numerous state offices and to the United States Senate.

SCHUYLKILL, *skool'kil*, a river which rises in the northeastern part of Pennsylvania, in the Blue Mountains, and flows south-eastward into the Delaware, five miles below the city of Philadelphia. It furnishes the chief water supply of Philadelphia, and power for manufacturing plants at Reading, Pottsville, Phoenixville and Morristown. Its length is 120 miles, and it is navigable as far as Philadelphia for boats of 400 tons.

SCHWAB, CHARLES M. (1862-), an American capitalist and president of the United States Steel Corporation, was born at Williamsburg, Pa. His first connection with the steel industry was as a stake driver in the engineering corps of the Edgar Thompson Steel Works, of which institution he later became superintendent. He rose steadily to the position of general superintendent of the Homestead Steel Works, and in that capacity served until 1897. In 1903 he became president of the Bethlehem Steel Corporation, which prospered wonderfully under his control; in 1915 he went to London and secured enormous munition contracts to supply the allies during the World War. In 1918 Schwab was appointed director-general of shipbuilding, in the United States Shipping Board Emergency Fleet Corporation. He is the author of an inspirational book, *Making Life Worth While*.

SCHWATKA, *shwo't'ka*, FREDERICK (1849-1892), an American Arctic explorer, born at Galena, Ill. He was graduated from West Point in 1871 and was occupied with garrison duty on the frontier until 1877. Meantime, he continued his studies and was admitted to the bar in Nebraska and received a degree in medicine in 1876. Two years later he started for the north polar region in search of Sir John Franklin and his party. After a journey fraught with great peril, he returned with evidence of the final destruction of the Franklin expedition. Later he explored the Yukon River in Alaska and also made several expeditions through unknown parts of Mexico. He has narrated his experience in three books, *Along Alaska's Great River*, *Nimrod in the North* and *Children of the Cold*.

SCIATICA, *si at' i kah*, neuralgia of the nerve trunk which passes down the back of the thigh, called the great sciatic nerve. It is caused usually by exposure, strain, pressure of constipation, and usually attacks persons subject to gout or rheumatism, but is sometimes a complication of spinal disease, diabetes and other disorders. Severe pain in the region of the hip is the chief symptom. If not properly treated sciatica tends to become chronic. Treatment includes rest, injection of medicine into the nerve and, in severe cases, local operation.

SCIENCE AND THE SCIENCES.

Science is a term derived from the Latin verb *scire*, meaning to *know*; therefore in the broadest sense of the term *science* means *knowledge*. But in the sense in which it is ordinarily used, it means knowledge gained through observation and study and organized by experience into a systematic whole. However, when we consider science in this light, we apply it to some branch of knowledge, which we call *a science*—such as the science of botany, or the science of ethics. In our study of science, then, we are dealing more with the *sciences* than with science in the abstract.

The ancient Greek philosophers, to whom we look for the first classification of sciences, had little difficulty in making their classifications. Aristotle, for instance, divided all sciences into three classes—*theoretical*, *practical* and *poetical*, meaning by poetical, creative or technical sciences. But as knowledge was extended, a more complete classification of its various branches became necessary, and now we have almost as many sciences as there are branches of knowledge.

We are inclined, however, to narrow our conception of the sciences to those branches of knowledge that pertain to the phenomena of nature, or to what we are pleased to call the natural sciences. Such a conception is too narrow, for we have sciences that deal with human conduct, as well as with phenomena of nature. Among such sciences are esthetics, ethics and civics.

The truly scientific investigator never jumps at conclusions; he never takes anything for granted. Unless the supposition under consideration is backed by sufficient evidence to warrant its acceptance he lays it aside for further investigation. He works from his knowledge of the general law of cause and effect, knowing that under the same circumstances the given conditions always lead to certain results.

Pseudo Sciences, a term describing so-called beliefs and practices out of which grew the organized scientific knowledge of to-day. It also includes various cults that have persisted through the ages which are not to be explained on rational grounds. Examples of the first group are alchemy, the forerunner of chemistry; astrology, which developed into astronomy. In the latter category may be classed clairvoyance, mind reading, superstition, palmistry, phrenology, telepathy, physiognomy, spiritualism, mesmerism, faith cure, theosophy, etc., which true science cannot accept.

Related Articles. The following are the most important branches of science treated in these volumes:

Algebra	Mathematics
Anatomy	Meteorology
Anthropology	Mineralogy
Archaeology	Numismatics
Arithmetic	Oceanography
Astronomy	Paleontology
Biology	Philology
Botany	Philosophy
Calculus	Phonetics
Chemistry	Physical Geography
Economics	Physics
Ethnography	Physiology
Ethnology	Psychology
Eugenics	Sanitary Science
Geography	Sociology
Geology	Zoology
Geometry	

SCILLY, *sil'y*, ISLANDS, a group of about 140 small British islands situated at the entrance of the English Channel, about thirty miles from Land's End. Six islands are of some importance, the others being mere points of rock. The inhabitants are engaged in fishing and in the cultivation of flowers and vegetables. Population, 1911, 2,500.

SCIPIO, *sip'eo*, PUBLIUS CORNELIUS (237-about 185 B. C.), surnamed SCIPIO

AFRICANUS THE ELDER, one of the most illustrious of Roman warriors. He took part in the battles of Ticinus and Cannae, in the first Punic War, and in 212 B. C. was unanimously elected aedile. The following year he became proconsul in Spain. His first enterprise of importance was the conquest of New Carthage, the stronghold of the Carthaginians in Spain. The next year (209) he totally defeated Hasdrubal, Hannibal's brother, and in 207 won a decisive victory over Mago and Hasdrubal, the son of Gisco. The result was to drive the Carthaginians from Spain, and Scipio was empowered to lead an army against Carthage itself. The Carthaginians recalled Hannibal from Italy, but the great Battle of Zama (202 B. C.) resulted in the total defeat of the Carthaginians. On his return to Rome, Scipio was honored with a triumph and received the surname of *Africanus*. After the successful close of a war with Antiochus, king of Syria, in 189 B. C., Scipio retired to private life. See **CARTHAGE**; **ROME**, **HISTORY OF**.

SCIPIO, PUBLIUS CORNELIUS AEMILIANUS (about 185-129 B. C.), surnamed **SCIPIO AFRICANUS THE YOUNGER**, a distinguished Roman general, a grandson by adoption of Scipio Africanus the Elder. In 151 B. C. he accompanied the consul, Lucius Licinius Lucullus, to Spain as military tribune, and two years later, on the outbreak of the Third Punic War, he commanded in Africa under Manius Manilius. His services were so important that in 147, although not of the legal age, he was unanimously chosen consul and leader of the forces against the Carthaginians. In 146 he took, and by command of the senate, burned, Carthage, for which he was honored with a triumph at Rome and with the surname of *Africanus*. In the last years of his life he engendered much enmity among the people by opposing the measures of the popular party, especially the agrarian law of Tiberius Gracchus.

SCISSORBILL, *siz'er bill*, or **SKIMMER**, a bird of the gull family, named because of its peculiar elongated, compressed bill, of which the lower mandible much exceeds the upper in length and shuts into the latter somewhat after the fashion of a knife blade into its handle. This beak is of an orange color at its base and black at its tip. The bird is found along the Atlantic coasts of America and Africa. It is often seen skimming along the water, thrusting the lower bill

into the water in its search for food. The general color of the bird is dark above and white below, with a band of white across its wings.

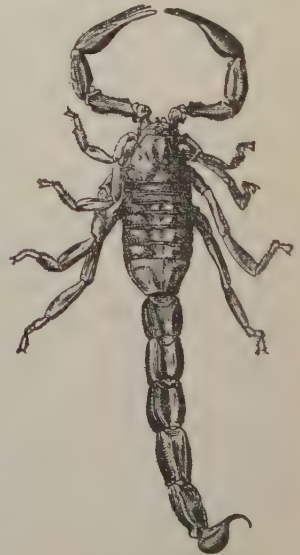
SCLEROSIS, *skle ro'sis*, in physiology, a hardening of the tissues in some part of the body. Hardening of the middle coat of an artery is a common form of sclerosis, and causes many deaths among city dwellers. It is frequently associated with heart and kidney diseases. Hardening of the normal tissue of the liver is called *cirrhosis*. Various nervous diseases, notably locomotor ataxia, result from degeneration of the tissue of the brain or spinal cord.

SCORPIO, *skor'pe o*, the eighth sign of the zodiac, the "accursed constellation," considered by astrologers to exercise a baneful influence upon human destinies. In ancient astrology the symbol (♏) was meant to represent the arrow-shaped sting of the scorpion. This constellation is attended at its setting by tempests and autumnal diseases.

Related Articles. Consult the following titles for additional information:

Aries	Orion
Astronomy	Zodiac

SCORPION, the name of a group of animals belonging to the same class as the spiders. They live in tropical and warm temperate regions, and are not found in America north of Nebraska. In the southern part of the United States there are about twenty species. The body consists of two parts, one containing the head and thorax and called the *cephalothorax*, and the other a long, jointed abdomen, the last five segments of which form a tail. Four pairs of legs and two pairs of mandibles or pincers are attached to the cephalothorax; the second pair of pincers resemble a lobster's claws.



SCORPION

The abdomen contains breathing pores and the last segment of the tail is armed with a sharp poisonous sting, the poison being secreted by two glands at its base. The eyes vary in number from six to twelve, according to the species. Scorpions are usually black or yellowish in color. The young are carried on the body of the mother for several days after birth. They cling to her body by the pincers.

Scorpions remain hidden in crevices and under rocks by day, and are active at night. They feed upon insects and spiders, and are dreaded by man because their sting causes a serious and painful wound, though it is seldom fatal. The poison should be sucked from the wound as soon as possible, and the wound bathed with ammonia, which should be also taken internally.

SCORPION FISH, a genus of fishes belonging to the gurnard family. The *red scorpion fish* is a familiar form. The *spotted scorpion fish* is a second species, and, like the preceding, is native to British waters as well as in the Mediterranean, the Atlantic, and the tropical seas. Another species is the common market fish of Southern California, measuring a foot in length and colored brown and olive.

SCORPION FLY, an insect related to the dragon fly. The name *scorpion fly* is derived from the appendages attached to the abdomen of some species. The male in the common species, for example, has the sixth and seventh joints of the abdomen attenuated and capable of extensive motion, while the last joint forms a pair of forceps, resembling those of the earwigs. When at rest this tail is curled over the back, but when irritated the forceps are used as weapons of offense or defense.

SCOTCH TERRIER, a small dog weighing from fourteen to twenty pounds, with a long head, dark eyes and upright ears. The hair is rough and coarse, and may be black, reddish, brindled or sandy. The tail is carried erect. The dogs are intelligent, gentle and active and in demand as pets.

SCOTCH VERDICT In American courts a person who is tried for an alleged offense before a jury meets with a verdict of "guilty" or "not guilty." In Scotland, in cases where the evidence is not conclusive in either of the above directions, the jury may return the verdict, "not proven." The accused must then be freed.



SCOTLAND, the political division of the United Kingdom occupying the northern part of the island of Great Britain, and including the Hebrides, Orkney, Shetland and other islands. It is separated from England by the Cheviot Hills and Solway Firth. Scotland is the Caledonia of the Romans, a land of irregular coasts and rugged surface; of beautiful lakes and hardy people; the land of which Scott sang:

O Caledonia! stern and wild,
Meet nurse for a poetic child!
Land of brown heath and shaggy wood,
Land of the mountain and the flood.

Scotland's wild beauty, warring factions and devoted heroes have been celebrated in legend, poetry and song until the country is known wherever the English tongue is spoken.

Location and Size. With the exception of the boundary separating it from England Scotland is surrounded by the sea. The coast line is very irregular and has an extent of 2,300 miles. The most northerly point of the mainland is in about the same latitude as Petrograd, the southern point of Greenland and the southern coast of Alaska. The greatest length from northeast to southwest is 287 miles, and the breadth varies from less than thirty to 140 miles. The area, in-



SCOTCH TERRIER

cluding islands, is 30,404 square miles, or a little less than that of South Carolina. On the eastern coast the most prominent inden-

tations are Moray Firth, the Firth of Tay and the Firth of Forth, while on the south and west are Solway Firth, the Firth of Clyde, the Firth of Lorne, the Sound of Sleat and Loch Broom. With the exception of the sound, each of these indentations terminates in an estuary.

The People. About one-tenth of the inhabitants of the United Kingdom live in Scotland. The native inhabitants are known as Scots or Scotch. Those occupying the northern portion of the country, particularly the highlands, are of Gaelic descent, and among them the Gaelic language is still spoken, though most of the younger people have learned the English (see CELTS). The southern portion of the country contains a large number of people of English descent. The Scotch are a hardy race, known the world over for their integrity, industry and thrift. The Highlanders are the tallest people in the world, averaging from five feet eight inches to six feet in height. They still retain their ancient style of dress, with the kilt and the plaid for special occasions, and the bagpipe still awakens the echoes of hill and glen. The clan or tribe which has played so conspicuous a part in their history continues to be important in social life. The highland regions are sparsely settled, but in the lowlands the people have gathered in large cities and towns, and the movement city-ward is increasing. In this part of the country fully three-fourths of the inhabitants dwell in cities, of which Glasgow, with over 1,000,000 inhabitants; Edinburgh, with over 420,000, and Aberdeen and Dundee, each having a population of about 160,000, are the most important.

In religion the larger part of the population are followers of the Presbyterian faith, though other Protestant churches have considerable following, and in the larger cities the Church of England is maintained, but neither this Church nor the Roman Catholic Church has as numerous a following, in proportion to the number of inhabitants, as in England or Ireland.

Surface and Drainage. The surface of Scotland is divided naturally into three divisions—the highlands, occupying the northern portion of the country; the central lowlands, immediately southeast of the highlands, and the southern uplands, which include the southern counties. The highland region, which embraces fully one-third of

Scotland, is noted for its numerous mountains and hills, the highest of which are the Grampian Hills, containing steep precipices and narrow valleys through which flow rapid streams or in which lie deep and clear mountain lakes. The highest elevation in this region and in Great Britain is Ben Nevis, which attains an altitude of 4,406 feet.

The central lowlands differ from lowlands in most other countries in being widely diversified by low hills, beautiful valleys and numerous lakes and streams. This region and the highlands have for centuries been famous for their beautiful scenery, and it was this portion of Scotland that Scott immortalized in his poems, *Lady of the Lake*, *Lay of the Last Minstrel* and *Marmion*, and in a number of his novels (see SCOTT, WALTER, Sir). In the southern uplands are found numerous ranges of low mountains, one of which, the Cheviot Hills, forms a portion of the boundary between Scotland and England. Another range extends southward into England. These are low mountains, and the highest peaks do not attain an altitude of 3,000 feet, but a number reach a height of 2,700 feet or over. The surface in this part of the country is less broken and irregular than in the highland region.

The most important streams flow to the east and enter the North Sea. The largest of these is the Tweed, and others worthy of mention are the Forth, the Tay, the Dee, the Don, the Spey and the Findhorn. Those entering the sea on the west are the Clyde, the Ayr, the Doon, the Dee, the Nith, the Annan and the Esk. The Tay has the greatest volume of water, but the Clyde has been canalized and thus made navigable for ocean ships as far as Glasgow. This renders it by far the most important commercial waterway of Scotland. The country is noted for its large number of beautiful mountain lakes. Among the most noted of these are Lomond, Katrine, Tay, Earn, Rannoch, Awe, Shiel, Ness and Maree, in the western and northern highlands, Leven in the central lowlands, and Saint Mary's Ken, Dee and Doon, in the southern uplands.

Climate. See GREAT BRITAIN.

Mineral Resources. The southern portion of Scotland is rich in minerals. By far the most important of these is coal, which is mined in large quantities in the County of Lanark, in which Glasgow is situated. Iron ore is found in the County of Ayr, to the



MAP OF SCOTLAND

west of the coal fields. Shale rock, which yields large quantities of shale oil, is extensively quarried in Linlithgow County. Granite, limestone, slate, clay and lead are also produced in paying quantities.

Fisheries. Surrounded, as it is, by cool waters and dotted with a large number of cold, clear streams and lakes, Scotland abounds in fish, and the taking of them constitutes an important industry of the people.

The annual catch is valued at about \$20,000,000. The varieties taken in largest quantities are herring, haddock and cod. Steam trawlers are replacing the sailing vessels, and this change is forcing most of the private fishermen out of business, since they do not have the capital to compete with the large boats owned by companies which now control the salmon, whale and seal fisheries. The value of the fisheries for 1922, exclusive of salmon, was over \$19,000,000.

Agriculture. Its rugged surface, barren soil and cool climate render a large part of Scotland unsuitable for agriculture. In the lowlands all available land is tilled, and in the highlands and upland regions much of the country is devoted to stock raising. The highlands are well adapted to sheep, and the wool produced is of considerable value. Among the important crops are oats, barley, turnips, potatoes and hay. Forage crops are also raised for fodder. The country is known for its excellent breeds of cattle, among which are found the Ayrshire, the Jersey, the polled Angus and the Galloway (see **CATTLE**). Scotland is also the home of the Clydesdale horse.

Manufactures. The manufactures are important and furnish occupation for fully one-fourth of the inhabitants. The most important manufacturing industries are those producing woollens, cottons and linens. These are followed by the iron and steel industries, whose center is at Glasgow; along the Clyde are found the largest shipyards in the world. Here were built the great ships of the Cunard line, and some of the most famous yachts of the world. The Clyde yards were the center of shipbuilding for the British Empire during the World War. Glasgow is also noted for its manufacture of chemicals, and throughout the country are found breweries and distilleries, some of which have become famous for their products. Edinburgh is noted as one of the great publishing centers of the English-speaking world. In other localities sugar refining and the manufacture of paper, glass, gloves, hosiery and various small wares give employment to a large number of people.

Transportation and Commerce. See **GREAT BRITAIN**, subhead *Transportation and Commerce*.

Education. The public education system of Scotland was reorganized by an act of Parliament passed in 1918. Central administration is under the control of the Scotch Edu-

cation Department, which is empowered to establish an advisory council consisting of not less than two-thirds of its membership. The duty of the council is to advise and make recommendations to the department. The counties and the five large burghs act as education authorities administered by boards elected by local government units. The bill also provided for the establishment of nursery schools for children between the ages of two and five, and made school attendance compulsory between the ages of five and fifteen. No exemptions may be granted to pupils below the age of thirteen. Restrictions on the employment of children are rigid.

There are several endowed schools and schools under private management which give high school instruction. Universities are maintained at Saint Andrew's, Glasgow, Aberdeen and Edinburgh. These are aided by government grants and by funds contributed by Andrew Carnegie. Much attention is given to technical instruction, and at Glasgow is the Royal Technical College, the largest school of its kind in the British Empire.

Government. The Local Government Board for Scotland, for the administration of local affairs, was created in 1894. It consists of the Secretary for Scotland, the Governor-General, the Undersecretary and three other members appointed by the sovereign. The counties and parishes are administered by councils, and burghs or town by municipal boards, provosts and bailies.

For the central government, see **GREAT BRITAIN**, subhead *Government*.

Language and Literature. Down to the fifteenth century the term *Scottish language* meant the Gaelic, or Celtic, tongue, while the language of lowland Scotland was looked upon as English. Such it really was—Northern English, with certain peculiarities of its own. The term *Scottish* came to be applied to it as possessing these peculiarities and as having a somewhat distinctive literary use. This language has been divided into three periods. During the *early* period, extending to the end of the fifteenth century, there was little difference between the language of Scotland and that of England north of the Humber. In the *middle* period, which extended to the Union, it was influenced in a slight degree by the Gaelic, and in a more pronounced manner by French and Latin, consequent on the French alliance and the re-

vival of learning. During the *modern* period, it has been to a considerable extent affected by modern literary English, though the genuine vernacular may still be heard in many districts.

The *Sir Tristram*, a metrical romance dating from the end of the thirteenth century, doubtfully attributed to Thomas the Rhymer, is by some regarded as the earliest piece of Scottish literature, but the first undoubted specimen of Scottish literature is the *Bruce* of Barbour (about 1375). Down to the middle of the sixteenth century four names stand out prominently, namely, Henryson, Dunbar, Gavin Douglas and Sir David Lindsay. Then, with the exceptions of Alexander Scott, Arbuthnot, Rolland of Dalkeith, Sir William Alexander and Drummond of Hawthornden, about a century and a half elapsed before any eminent poet arose. In the third period of the language the first notable name is that of Allan Ramsay (1686-1758), author of *The Gentle Shepherd* and of numerous shorter pieces and songs. To this same age belongs also nearly the whole of that remarkable body of song known as the Jacobite minstrelsy. The most prominent Scotch writers, aside from those mentioned, are Fergusson, Robert Burns, Hector MacNeill, Sir Walter Scott, James Hogg, Robert Tannahill, Joanna Baillie, George MacDonald, Robert Louis Stevenson, John Watson and J. M. Barrie. Besides these there is a long list of philosophers, legal writers and physicians, such as Adam Smith, Barclay and Liddell.

History. The part of the island of Britain which lies north of the Firth of Forth and the Clyde was known by the Romans from the first century A. D. as Caledonia. The name *Scotia* (Scotland), limited in the early periods to Ireland, was used from the tenth century on for a part of Scotland, and after the thirteenth century it was applied to the present realm of Scotland. The oldest inhabitants of the country were the Picts. When the Romans, during the time of the emperor Claudius, conquered the southern part of Britain, the northern part, Caledonia, remained independent. When Agricola was in Great Britain he made several incursions into Caledonia and won some victories, but after his recall these advantages were lost by the Romans. As a protection on the north for their British territory, the Romans during the time of Emperor Hadrian

built a wall between the Firth and the Tyne. Under Antonius Pius a second wall was built farther north. In spite of these fortifications, however, Britain was constantly, after the third century, disturbed by invasions of the Picts. About the middle of the fourth century, the Scots, who had come from Ireland and settled in the northwestern part of Caledonia, began to take part in these invasions.

The history of Scotland during the time of the Anglo-Saxon conquest of Britain is enveloped in mystery. In the seventh century, when we again have historical accounts of the country, it is found divided into four kingdoms, those of the Scots, the Picts, the Britons and the Saxons. About the second half of the sixth century, Christianity had been introduced among the Picts, and the Scots had brought Christianity with them from Ireland. In 843 the king of the Scots, Kenneth, made himself ruler also of the Picts, and the kingdom thus formed was known for a time as Alban and later as Scotland. Early in the ninth century, Scotland began to be disturbed by the Danes and the Normans, who had made invasions of the country and had formed settlements on the islands about the coast.

The last king who was descended from Kenneth was Malcolm II. He was followed by Duncan, who was killed in 1040 by Macbeth. Malcolm III, known as Malcolm Canmore, the son of Duncan, defeated Macbeth and slew him, in 1057. When England was conquered by the Normans, in 1066, Malcolm took the part of Edgar Atheling, the legitimate ruler, and gave asylum to many of the Anglo-Saxon nobles. He was for this reason involved in long conflicts with William the Conqueror and was at length obliged to submit and do homage for his kingdom. The most noteworthy of the sons of Malcolm was the youngest, David I (1124-1153), who introduced into Scotland feudalism as it was in practice in England. David's grandson and successor, Malcolm IV, was unable to maintain in full the power which David had gained.

William the Lion (1165-1214), by reason of his claims on territory in the northern part of England, came into conflict with Henry II of England, was taken captive at Alnwick in 1174 and received his freedom only on taking the oath of allegiance to the English king. William was followed by his son Alexander, who, taking advantage of the disturbed con-

dition of England under John, invaded that country, was defeated and was compelled to do homage to the English king. Alexander III, by his defeat of the king of Norway, added to the kingdom the Isle of Man and the Hebrides.

After the death of Alexander and that of his granddaughter, Margaret, called the Maiden of Norway, numerous pretenders to the crown arose, among whom the most powerful were John Baliol and Robert Bruce. Edward I, chosen as arbiter between these two claimants, decided in favor of Baliol, who then in turn swore allegiance to the English crown. When Edward made his overlordship too oppressive, Baliol attempted with the help of France to make Scotland independent; but Edward invaded Scotland, and after a victory at Edinburgh he took Baliol to England with him as a prisoner. Scotland was now ruled by an English regent. Resistance under William Wallace was for a time effectual, and a great victory was gained at Stirling in 1297. Eight years later, however, Wallace, deserted by the Scotch nobles, was defeated and taken prisoner. Another popular leader was found in Robert Bruce, who declared himself king of Scotland, as Robert I, and in 1314 completely defeated an English army under Edward II at Bannockburn. For fourteen years from this date, Scotland was practically independent. Robert's son, David II, who succeeded him, was a minor, and new disturbances at once began in Scotland. War broke out with England in 1333, and after the Battle of Halidon Hill (1333) and that of Neville's Cross (1346), the Scottish kings were obliged to do homage to England.

With the accession of Robert II in 1371 began the Stuart dynasty. The kings of this line were for the most part strong and able men, but the fact that many of them came to the throne during their minority allowed the nobles to gain undue prominence. James I (1406-1437), who had been taken prisoner by the English before his father's death, was not allowed to return to Scotland until 1424. He proved, on gaining the authority, to be a man of much strength of character, and he introduced order into his kingdom, put down the nobility and greatly encouraged commerce and industry. James IV (1488-1513) became involved in a war with England on account of his support of the pretender, Perkin Warbeck, but soon concluded a truce, and married, in 1503, the daughter of Henry VII

of England. However, after the accession of Henry VIII to the English throne, James, who had formed an alliance with France, invaded Northumberland, but was defeated and killed at the Battle of Flodden Field.

The king's death plunged the nation into a state of anarchy; his successor, James V, had not yet reached the age of two years. His cousin, the Duke of Albany, was appointed regent, but from an early part of the reign James was almost entirely in the hands of the earl of Angus, who had married the queen dowager and had almost complete control of affairs till 1528, when James, then in his seventeenth year, managed to escape to Stirling, take the government into his own hands and drive Angus into England. His alliance was sought by England, France and Spain, and in 1537 James married the daughter of Francis I. The young queen died a few weeks after her arrival in Scotland, and in the following year James married Mary of Lorraine, daughter of the Duke of Guise. Henry VIII made several attempts to induce James to join the Reformation, but James remained a supporter of the old faith as against the reform doctrines.

The eventful period which followed the accession of Mary was dominated by the Reformation movement and by the questions affecting the union of Scotland and England. A scheme to marry the young queen to Edward, son of Henry VIII, was defeated, and the old league with France was renewed.

James VI, the son of Mary, was but a child, and a succession of regents governed the kingdom. On the death of Elizabeth of England, in 1603, James succeeded to the throne as the nearest heir, through his descent from Margaret, daughter of Henry VII and wife of James IV.

There were seven Scottish Parliaments called by James after his accession, wherein he was represented by a commissioner sitting as president. His chief energies were directed to an attempt to draw England and Scotland into a closer union, by means of harmonizing the laws of the two countries and by establishing episcopacy in Scotland. In furtherance of the latter object he visited Scotland in 1617 for the only time after the union of the crowns. There were many acts passed for promoting trade and commerce, and the nation about this time seems to have been seized with a mania for colonization, as many thousands of the inhabitants

left their native land for the Irish province of Ulster or the more distant shores of Nova Scotia. James died in 1625 and was succeeded by his son, Charles I.

Foreign wars and domestic troubles prevented Charles from visiting Scotland till 1633, when he was crowned at Edinburgh. The church was now entirely governed by the bishops, and civil affairs were managed by the privy council. At the outbreak of the civil war in England, Scotland took the part of the Parliament against the king, the Solemn League and Covenant being entered into between the Scottish Presbyterians and the English Parliament.

After the execution of Charles, in 1649, the Scots proclaimed his son king, under the title of Charles II. The young king was then in Holland, and commissioners were sent over from Scotland to inform him that the governing body was willing to join his cause if he would take the covenant. This Charles agreed to do, and he was invited over to his northern kingdom. He arrived in Scotland, was crowned at Scone in 1651 and immediately marched into England. Cromwell, who had already defeated him once in Scotland, followed, and at Worcester utterly scattered the royalist force and compelled Charles to become a fugitive (September 3, 1651). Cromwell returned to Scotland for a time, and on his departure for England he left Monk to complete the work. Cromwell's death was followed by his son's fall, Monk's march to London at the head of the army and the restoration of Charles II (1660). It soon became apparent that Charles was determined to carry out the favorite scheme of his father and grandfather, of establishing the episcopacy in Scotland. This attempt was violently opposed and led to a cruel persecution, which lasted with more or less severity during the whole of the reign of Charles. Hundreds were executed; others were fined, imprisoned and tortured, and whole tracts of the country were placed under a military despotism of the worst description. Under James II the chief events of Scotland were the rising, defeat and execution of Argyll; the declarations of indulgence by which many of the Presbyterian ministers returned to their charges, and the continued persecution of the strict Covenanters. At the Revolution of 1689, William, James's son-in-law, and Mary restored religious freedom.

The death of William III in 1702 transferred the crowns of the two nations to Queen Anne, sister of Mary. In 1703 the Parliament of Scotland issued a declaration which showed an intention, in case of the death of the queen, to appoint a different sovereign from the English king, and the ill feeling between the two countries grew so strong that English statesmen became convinced that a union was essential for the peace of the two countries. A joint commission was appointed to draw up articles of union in 1706. In the Scottish Parliament the articles encountered a strong opposition, but a majority finally carried the measure in January, 1707. Thenceforth the history of Scotland is identified with that of Great Britain. Scotland furnished its full quota of troops in the World War, and bands of Highland troops in their kilts performed some of the most daring feats of the war. A regiment of Scotch Canadians so impressed themselves upon the foe that they won from the Germans the name "Ladies of Hell." See GREAT BRITAIN, subhead *History*.

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HISTORY

Balliol, John De	James I (England)
Bannockburn	Knox, John
Bruce, Robert	Macbeth
Caledonia	Mary Stuart
Edward I, II and III	Picts
(England)	Wallace, William
England (history)	World War

ISLANDS

Hebrides	Shetland
Orkney	

LAKES

Katrine	Lomond
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RIVERS

Clyde	Solway Firth
Forth	Tay

SCOTLAND YARD, a group of buildings in London, England, long famous as the headquarters of the city police force. It is situated at the southeast corner of Charing Cross and takes its names from a palace formerly reserved for the entertainment of Scottish kings when visitors to London. Since 1891 the police department has occupied buildings on the Thames Embankment, known as the New Scotland Yard. The name occurs prominently in English detective stories.

SCOTT, HUGH LENOX (1853-), a retired chief of staff of the United States army. He was born at Danville, Ky. For several years after his graduation from West Point he led expeditions against the Indians. He served successively as adjutant-general of Cuba; governor of the Sulu Archipelago (Philippines), from which islands he abolished slavery; and with the rank of colonel, superintendent and commandant at West Point. In 1913, as brigadier-general, he was placed in command of a brigade of cavalry stationed along the Mexican border. Scott showed great ability in settling difficulties by diplomatic efforts, as was evident in the skill with which he pacified a lawless band of Piute Indians in Utah and in dealing with the Villa faction in Mexico. In 1915 he was advanced to the grade of major-general, and from November, 1914, to September, 1917, was chief of staff. After serving on the United States Commission to Russia, headed by Elihu Root, he was appointed commander of the 78th Division at Camp Dix, N. Y., receiving command in March, 1918.

SCOTT, ROBERT FALCON (1868-1912), a celebrated English naval officer and Antarctic explorer, who shares with Amundsen the honor of having reached the South Pole. He was born at Outlands, Devonport, and was educated at Stubbington House, Fareham. In 1882 he entered the navy and rose in eight years to the rank of commander. In 1901 he led an expedition to the south polar regions, where he remained until 1904. On his return to England he was promoted to the rank of captain in recognition of his achievement. In 1909 he was appointed to command the British Antarctic Expedition, whose object was to make extensive investigations in the polar regions and also to locate the South Pole. Scott and four companions reached the Pole on January 18, 1912, but on his return trip lost their lives from



ROBERT F. SCOTT

exposure in a terrific blizzard. The fate of Captain Scott and his companions as recorded in their diaries, will always remain one of the most glorious and most tragic in the history of exploration and discovery. See SOUTH POLAR EXPLORATION.

Grave, at
Dryburgh Abbey

SCOTT, WALTER, Sir (1771-1832), a Scotch poet and novelist to whom is credited the creation of the historical novel. He was born in Edinburgh, entered the high school there in 1779, and in October, 1783, was matriculated at the University of Edinburgh. However, neither at school nor at college did he manifest special ability. At the age of sixteen he began in his father's law office a term as apprentice, and in 1792 became a member of the Scottish bar. In 1797 he married Charlotte M. Charpentier, the daughter of a French refugee. Two years later he was appointed sheriff of Selkirkshire, and in 1806 became a principal clerk of the Court of Session.

Scott, the Poet. Scott's first ventures in literature were a translation of Bürger's *Lenore*, and *The Wild Huntsman*, which he published in 1796. Then followed the ballads of *Glenfinlas*, *The Eve of Saint John* and the *Grey Brother*; a translation of Goethe's *Götz von Berlichingen*; the three volumes of the *Minstrelsy of the Scottish Border*, and an edition of the old metrical romance of *Sir Tristram*. In 1805 he became prominent as an original poet, with the publication of the *Lay of the Last Minstrel*, an extended specimen of the ballad style, which became widely popular. In 1808 he published *Marmion*, another poetic romance, which greatly increased his reputation. In 1810 the *Lady of the Lake* appeared, in which his poetical genius seems to have reached its height. His subsequent poetical productions, *The Vision of Don Roderick*, *Rokeby*, *The Bridal of Triermain* and *The Lord of the Isles*, were not so widely acclaimed.

Scott, the Historical Chronicler. Upon the decline of his popularity as a poet, and realization that Byron was surpassing him in his own field, Scott turned his attention to the prose romance, for which the greater part of his early life had been a preparation. The appearance of *Waverley* in 1814, forms an epoch in modern literature as well as in the life of Scott. This romance was rapidly followed by the series known as *The Waverley Novels*, which comprises such masterpieces of historical fiction as *Ivanhoe*, *Guy Man-*

nering, *The Heart of Midlothian*, *The Bride of Lammermoor*, *The Legend of Montrose*, *The Monastery*, *Kenilworth*, *Quentin Durward* and *The Talisman*. Among these, the novels dealing most intimately with Scottish life are counted among his best.

Scott, Man of Business. The desire to become an extensive landed proprietor and to found a family was always one of Scott's ambitions, and this he began to gratify in 1811 when he purchased a small farm of about 100 acres lying on the south bank of the Tweed. By degrees, as his resources increased, he added farm after farm to his domain, until he had completed the estate to which he gave the name of Abbotsford, the "romance in stone" (see page 2).



SIR WALTER SCOTT

In 1820, when he was made a baronet by George IV, he reached the zenith of his fame and material prosperity. But this prosperity was founded on no solid basis, and the crash came in 1826, when Constable & Co., Edinburgh publishers, were obliged to suspend payment, hopelessly involving Ballantyne & Co., with whom it then appeared that Scott was a partner. The liabilities thus incurred by him amounted to about \$600,000. Although he might have compromised with his creditors, Scott assumed this sum as a personal obligation. He worked like a galley slave to clear off the debt, his novels and historical writings following each other with incredible rapidity. Within two years he was able to pay his creditors \$200,000. *Woodstock*, *The Fair Maid of Perth*, *Anne of Geierstein*, *A Life of Napoleon* (nine volumes), were a few of the works which flowed quickly from his pen between 1826 and 1831.

The strain was too great, however, and in 1830 Scott had an attack of paralysis, from which he never fully recovered. A trip to Italy did him little good, and he returned to Abbotsford to die. He was buried in his family burial aisle, amidst the ruins of Dryburgh Abbey. Some years after his death his debt was entirely liquidated by the sale of copyrights and the constantly-increasing sale of his works.

The biography of Scott written by his son-in-law, John Gibson Lockhart, has become a classic.

SCOTT, WINFIELD (1786-1866), an American soldier who distinguished himself in the War of 1812 and the Mexican War was born near Petersburg, Va. He was educated for the law, and was admitted to the bar, but never practiced. Entering the army, he served with distinction in the War of 1812, won the Battle of Chippewa, and was severely wounded in the Battle of Lundy's Lane. In 1832 and in subsequent years, General Scott was employed in operations against the Indians, and in 1841 was appointed commander in chief of the United States



WINFIELD SCOTT

army. His fame rests chiefly upon his brilliant conduct of the Mexican War, where he gained victories at Cerro Gordo, Contreras, Churubusco, Molino del Rey and Chapultepec. Although he was known as "Old Fuss and Feathers," after his successful entry into the City of Mexico and the conclusion of an advantageous peace, he was hailed as a national hero. He was twice an unsuccessful candidate for the Presidency. At the outbreak of the Civil War Scott remained true to the Federal government, but his infirmities rendered him unable to take actual command. He retired from active service in 1861, and in 1864 published his autobiography.

SCOTTI, *sko'te*, ANTONIO (1866-), an Italian basso in the front rank of operatic stars, was born in Naples. He made his operatic début at Malta in the rôle of Amonasro in *Aida*, at the age of twenty-three. In 1899 he made his initial appearance in the Metropolitan Opera House, New York, and since has been a member of the Metropolitan Opera Company, essaying leading rôles in *Faust*, *Othello*, *La Tosca* and *Il Pagliacci*, but achieving greatest triumph in Mozart's *Don Giovanni*.

SCOURING RUSH. See HORSETAIL RUSH.

SCRANTON, PA., in size the forty-first city in the United States, the third city of

the state and the county seat of Lackawanna County, is on the Lackawanna River, 162 miles north of Philadelphia and 145 miles northwest of New York, on the Delaware, Lackawanna & Western, the Central of New Jersey, the Delaware & Hudson, the Erie, the Central of New Jersey, the New York, Ontario & Western and the Delaware & Hudson railroads. It is the center of a fine and extensive system of electric railways. Scranton has three parks and a public square, in which the courthouse is situated. The chief public buildings are a postoffice, a city hall, a courthouse, an Albright Memorial Library, a Y. M. C. A. building, a Masonic Temple, a Board of Trade, a museum of natural history, a technical high school and two manual training schools. There are several hospitals, a school for the deaf and dumb, hotels of fine appearance and a local life insurance company. The city is the home of the International Correspondence Schools, the largest institutions of its kind in the world.

Scranton is in the center of the northern anthracite coal region and is one of the most important coal-distributing points in the country. There is also an extensive trade in miners' supplies. The industrial plants represent a capital of more than \$30,000,000 and are numerous and extensive, including blast furnaces, rolling mills, foundries, machine shops, glass works, silk mills, locomotive works and manufactories of knit goods, lace, carpets, buttons, pianos and numerous small articles. There are several private and denominational schools.

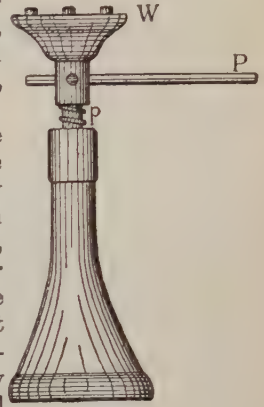
The first settlement within the present limits of the city was made in 1788 and was named Slocum Hollow. But Scranton was really founded in 1840 by two brothers, Joseph and George Scranton; hence, its name. In 1850 it was incorporated as a borough, and it was chartered as a city in 1866. Population, 1910, 129,867; in 1920, 137,783, a gain of 6 per cent.

SCREW, a simple machine, consisting of an inclined plane wound around a cylinder. The projecting spiral plane is called the *thread*, while the cylinder forms the *body* of the screw. To show that the thread is formed by an inclined plane, cut a paper triangle with one square corner and a length of at least three times its height. Draw a heavy pencil line along the edge of the slanting side of the triangle; then, beginning at the wide end, roll the paper around a pencil,

taking care to keep the edge of the triangle even with the end of the pencil. The dark line along the slanting side forms the thread of the screw. The distance between the threads is called the *pitch*, or *interval*. In the figure, *W* represents the weight; *P*, the point at which the power is applied, and *p*, the pitch.

To determine the weight that can be raised by a screw with the application of a given power, multiply the power by the circumference of the circle which it describes, and multiply this product by the number indicated by the denominator of a fraction showing the pitch. The circumference of the circle is found by multiplying its diameter by 3.1416. To illustrate: To find the weight which can be raised by a power of 25 pounds, acting upon a lever 3 feet long and attached to a screw having a pitch of $\frac{1}{4}$ of an inch, multiply the diameter of the circle, which is 6 feet, by 3.1416, and multiply this product (18.8496) by 12, to reduce the number to inches. The product equals 226.1952 inches. This number, multiplied by 4, the denominator of the fraction indicating the interval, or pitch equals 904.7808. The power, 25 pounds, multiplied by this number, gives 22,619.52 pounds, the weight that can be lifted. Because of the great power gained by the screw, it is used in raising buildings, in presses, and for holding together parts of machinery, pieces of wood and other articles.

SCREW PINE, or **PANDANUS**, a genus of plants growing in the tropical parts of the eastern hemisphere, which take their name from the spiral arrangement of their long, pineapple-like leaves. In some species, peculiar roots are sent out from various parts of the stem, which upon entering the ground serve as props for the trunk. One Indian species produces flowers, the fragrant buds of which are used for flavoring purposes and as a basis for perfumes; another furnishes strong fibers, from which the natives make sugar bags; and in another species, the tips of the shoots as well as the seeds are edible.



SCRIBE, *skreeb*, AUGUSTIN EUGÈNE (1791-1861), a French dramatist and librettist, born in Paris. His first distinct success was achieved in 1816. From this time on he worked in collaboration with others, and the dramatic pieces ascribed to him, numbering about 400, include all the departments of the lighter drama. Because of their gaiety, plot interest, and the felicitous manner in which their author depicted modern French life, they achieved great popularity over the European continent, and have also been introduced on the American and English stage in the form of translations or adaptations. Two of the best known among them are *Valérie* and *Adrienne Lecouvreur*; he is, however, best known for his libretti, *Fra Diavolo*, *Robert le Diable* and *The Huguenots*.

SCROFULA, a form of tuberculosis in which the neck glands or other lymphatic glands swell, and the tissues become devitalized. Hygienic treatment is the most effective line of cure, with special emphasis on fresh air, nourishing food, tonics and proper clothing. Local treatment of the glands to reduce swelling is also practiced. During the Middle Ages it was believed that scrofula could be cured by the touch of the sovereign, and the disease was known as *king's evil*. It is said that Samuel Johnson was touched by Queen Anne for scrofula when he was a young child.

SCRUPLE, a measure of weight in apothecary's weight, equivalent to 20 grains, $\frac{1}{2}$ part of a drachm, $\frac{1}{4}$ part of an ounce and $\frac{1}{16}$ part of a pound. It is used by pharmacists in compounding medicines.

SCUDDER, *skud'er*, VINA DUTTON (1861-), a notable American woman who achieved fame as an English scholar. She was born in India, and completed her education at Oxford University, England, and in Paris, after which she joined the faculty of Wellesley College, Massachusetts, as professor of English. She wrote *An Introduction to the Study of English Literature*, once a popular text-book.

SCULPIN, *skul'pin*, a group of small fish of about 250 varying-colored species, found in the northern seas and on the Pacific coast of America. The shape resembles that of the bull-head catfish, and the body is covered with warty projections. Common species are known locally as *miller's thumb*, *Irish lord* and *sea raven*.



SCULPTURE, the art of imitating living forms in solid substances. The word means, strictly, a cutting, or carving, in some hard material, as stone, marble, ivory or wood; but it is also used to express the molding of soft substances, as clay or wax, and the casting of metals or plaster. Three forms of sculpture are usually recognized. When the object stands free, it is said to be *in the round*; when it projects slightly from a solid

surface it is said to be *in relief*; when it is cut into or sunk down into the surface it is said to be *in intaglio*.

A sculptor wields
The chisel, and the stricken marble grows
To beauty,

wrote the poet Bryant in his *Flood of Years*, and in one of Michelangelo's sonnets the artist speaks of the unhewn stone becoming "a living mould." It is this phase of sculpture that sets it apart from the other arts of design; it is preëminently the art best adapted to the portrayal of the human form, the one that gives "life to the cold marble."

How a Statue Is Made. In most sculpture it is customary for the artist to make for himself an image of life size, fashioned in wet clay. For a head or bust a flat board, set on a high stand, with a piece of wood standing at right angles to it, is used. Lead piping is sometimes employed to raise the height of this piece of wood, and around this structure the clay is roughly built up, a cylindrical mass for the neck and an egg-shaped form for the head. For a full-length figure an "armature" is prepared, consisting of an iron rod through the center, attached to which are other irons, in the case of statues, or lead piping, for statuettes. These are bent to the required positions, the whole, when complete, representing in line the pose and character of the intended figure. Upon and around this framework the figure is first roughly built up with clay, care being taken to add just as much as is requisite and to follow the general form and direction of the muscles. The essential difference between modeling and carving is that in the former

the artist works from within outward, by the addition of material, while in the latter he works from without inward by the taking away of material. The sculptor's work proper generally ends with the completion of the clay model.

The next process is that of casting. Plaster of Paris of the consistency of thick cream is poured over the model, to the depth of from two to three inches, the inner layer being colored. When this is set, the clay is carefully removed, and what is termed a "waste mold" is formed. This is carefully washed and when dry is oiled. Into this mold, plaster of Paris is poured, and when this has set hard, the waste mold is chipped off. The plaster of Paris has taken the place of the clay and formed what is called a "cast." A head is usually cast in halves, and a similar treatment is adopted in the case of complete figures. This is termed "piece molding." Parts which project very much are removed and cast separately, being afterward attached by means of plaster of Paris. The reproduction of this plaster cast in marble or stone is a mechanical operation, usually intrusted to a skilled workman. To aid him he employs a "pointing machine," with which he takes exact measurements. Some sculptors work on the marble after a rough copy of the original is made, and some never touch it, but simply supervise the work. For casting in metal, a plaster mold is first made as already described. Within this is fixed a rudely-formed solid, but removable, mass, called a "core," the space between it and the surface of the mold being filled with the molten metal. Another method for smaller work is used, in which the mold is lined with wax and the core inserted close up to the wax lining. The wax is then melted out and the molten metal poured into the mold to take its place, the core being afterward removed.

History. *Egypt.* It is to Egypt that we must turn for the first signs of a developed form of sculpture. The distinctive characteristics of Egyptian sculpture are colossal size, stability and symmetry, the expression being that of calm repose and solemnity, with a suggestion of the supernatural. A conventional uniformity without life or action reigns everywhere. Most of the sculpture is relief and is defective in perspective and proportion, but the figures have a remarkable dignity and are true to life. The best period of Egyptian sculpture was from 1450

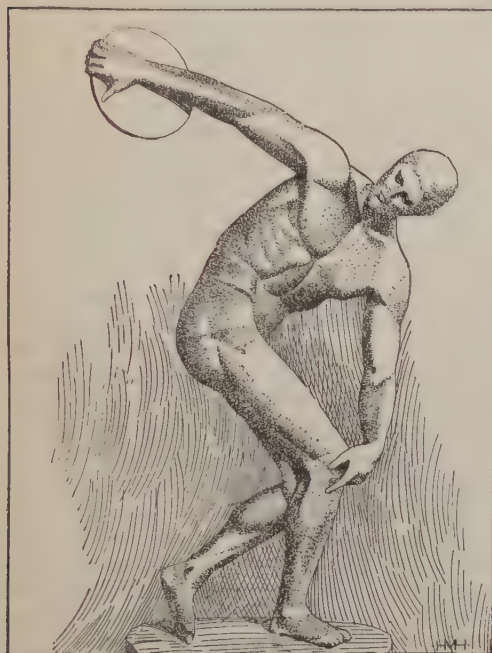
to 1000 B. C. In the British Museum is to be found a splendid collection of Egyptian sculptures, extending from 2000 B. C. to the Mohammedan invasion A. D. 640.

Assyria. The best period of Assyrian sculpture, as a style, is inferior to that of Egypt. Its characteristics are an intense and vigorous spirit of representation, without the least reference to ideal beauty of any kind. As compared with Egyptian work it is more realistic, but less true. It is powerful and energetic, but lacks grandeur; overladen with detail and ornamentation, it does not attain to the sublime in its repose, nor to beauty in its movement. Persian sculpture (560-331 B. C.) differs but little from Assyrian, and is usually included with it.

Greece. Greek sculpture, in its infancy, is strongly stamped with Oriental character, as may be seen by a careful examination of the reliefs from the temple of Assos, now in the Louvre, and the metopes from Selinus, casts of which are in the British Museum. But from the end of the sixth century B. C., the development of Greek art was rapid and continuous. In the sculptures for the Temple of Aegina, executed about 475 B. C., and now preserved at Munich, the figures of the warriors are no longer of the stiff, conventional type, with attitudes correct but lifeless; there is energy of movement in their action, and they have a living truth of gesture, only to be gained by artists who had studied the human form long and attentively. Upheld on the one hand by a noble mythology, that magnified, without distorting, human attributes, and supported on the other by an increasing knowledge of nature, the ultimate perfection of Greek art became only a question of time. It came to perfection in Phidias, whose statues of Athene, in the Parthenon at Athens (438 B. C.), and of Zeus, in the temple at Olympia, mark the period of the highest style of Greek art.

Other sculptors of this period were Myron, famed for his *Discobolus* (*Discus Thrower*), and Polyclethus, a close rival of Phidias. The special character of the art that flourished at Athens under the rule of Pericles (fourth century B. C.) consists in a perfect balance and combination of elements sublime and human. Sculpture had reached that point when a faultless imitation of nature was within its reach, but it had not yet abandoned its spiritual connection with a splendid mythology. We have, therefore, in the sculpture

of this period, the highest type of human beauty, joined to a godlike calm and reticence of motion. Examples of the grand style of this epoch are the sculptures of the



THE "DISCUS THROWER"

Parthenon and the Nike Apteros Temple, on the Acropolis; the colossal bronze head of Artemis, in the British Museum; the Venus of Milo, in the Louvre, and the exquisite relief representing the parting of Orpheus and Eurydice, in the museum at Naples.

Greek art, however, rapidly moved toward a still closer imitation of actual human life. The people, after the Peloponnesian War, spoiled by the luxury and pleasures which the prosperity of the Age of Pericles had opened to them, were not satisfied with the severe forms of the older masters. The sculptors now cultivated the soft, the graceful and the flowing and aimed at an expression of stronger passion, and they began to be fascinated by the force and variety of human feeling, as well as by the beauty of the human form. Jupiter, Juno and Minerva, favorite subjects of the Phidian Era, were exchanged for Venus, Bacchus and Amor. The representatives of this latter style were Scopas, his younger contemporary, Praxiteles, and Lysippus. The most important works of Scopas that survive are the dec-

orations of the mausoleum at Halicarnassus, erected by Artemisia over the remains of her husband Mausolus, Prince of Caria, 352 B. C. These sculptured decorations, now in the British Museum, present in the designs for the frieze, depicting a battle between Greeks and Amazons, an invention of graceful and energetic movement and a record of rapid and violent gesture such as clearly distinguish the work from that which it succeeded.

To Scopas is attributed the original of the *Venus de Milo*, the splendid copy of which now graces the Louvre. When an ancient Greek sculptor really believed in his gods and in the beautiful myths told regarding them, there must have come to him when making statues of them an inspiration which could come from no other task. Such an inspiration must have come to the unknown sculptor who carved the statue found in 1820 on the island of Melos, in the Aegean Sea, and so called the *Venus de Milo*. In the opinion of the critics there is nothing in



VENUS DE MILO

sculpture which surpasses this wonderful statue. The body and the draperies are bat-

tered, and both arms are gone, so that no one can be absolutely certain as to just what the position of the goddess was; but the nobleness of the ideal portrayed, the lines of the figure and the youthful beauty and majesty of the face make this *Venus* the chief glory of the Louvre, where so many priceless art treasures are gathered. The most plausible idea as to the position of the god-



APOLLO BELVEDERE

dess is the one which suggests that her left foot rested on a helmet and that a shield was supported on her left thigh.

The works of Praxiteles are especially valuable as expressing a tenderness of feeling which this new and closer sympathy with human emotion had developed. He is known to us chiefly through copies of his works, or of the works of his school, the most celebrated of which are preserved in the Vatican; but the sweetness and delicate grace of his style are admirably displayed in the statue of *Ceres* discovered at *Cnidus*, now in the British Museum. Lysippus represented the human form and athletic power in the highest perfection. From the death of Alexander the Great, 323 B. C., onward to the conquest of the Romans, 146 B. C., the progress

of Greek sculpture is only a further, and often a weaker, development of the same ideal. The celebrated group of the *Laocoön*, the head of the *Dying Alexander*, the *Dying Gladiator* and *Apollo Belvedere* are some of the works of this epoch that are preserved to us.

The *Apollo Belvedere* is so called from the Belvedere court of the Vatican, in which it now stands. This figure of the youthful god shows him as marvelously beautiful, yet the face expresses a divine wrath, which makes us feel certain that, with his bow in his outstretched hand, he is about to right some wrong or punish some evildoer. The statue loses none of its beauty for us because we know that what was long thought to be a Greek original is only a skilful Roman copy, or because the left hand and right forearm, which had been broken off, were restored by a sculptor in the time of Michelangelo. Notice the wonderfully graceful yet strong pose of the figure, the beautiful fall of the drapery, and the motion expressed in the whole composition. Although nothing definite can be determined as to the time of its production and the artist, the *Laocoön* was probably produced in the second century B. C. Vergil tells the story



LAOCOÖN

which this group illustrates—how *Laocoön*, priest of *Apollo* in *Troy*, warned the *Trojans*

against receiving into the city the wooden horse left by the Greeks, and how Apollo, to punish him, sent two huge serpents who attacked the priest and his two sons. The artist who made this statue has chosen to portray the moment of fiercest struggle, and thus there is something horrible about it. But the figures are so accurate anatomically, the passion and the pain shown on the faces and in the straining muscles are so real, that the group must rank with the great works of art of antiquity which have come down to us. No less a critic than Goethe held that the older son, the one to the left of the father, is not in pain, but is simply horrified at what he sees his father and his brother suffering, and that he is about to push off the coils of the serpent and stand free.

Between 1863 and 1867 French archaeologists were exploring the site of an ancient town on the island of Samothrace, in the Aegean. They found various objects of interest, but the greatest find of all was the statue which is called the *Nike*, or *Winged Victory*, of Samothrace, which is now in the Louvre. This statue is in a sadly mutilated condition; the head is gone, the arms are gone, the drapery is chipped. And yet it ranks with the *Venus de Milo*, and other of the most beautiful and famous works of art. Study the sketch of the statue given here. Even in this form there is enough to make clear to us the reason for its ranking by the critics. Notice the wonderful poise; the lift of the wings, the sweep of the draperies. It gives one a feeling of lightness, almost of the ability to fly, just to look at it. Nike, or Victoria, as the Romans called her, was the goddess of victory, and this statue was set up by the Greek ruler Demetrius in 306 B. C., after he had defeated the king of Egypt in battle.

After the time of the great sculptor Praxiteles a group of sculptors grew up, who, from the type of subjects in which they delighted, were known as the Pathetic School. The Laocoön was a product of this school, as was also another famous statue which is preserved in Florence, and which is probably the work of a pupil of Praxiteles. This is the *Niobe and Her Children*. Niobe was the wife of the king of Thebes and the mother of six beautiful daughters and six handsome sons, of whom she was very proud. In her pride she boasted that she was superior to

Leto, the mother of Apollo and Diana, who had but the two children. Moved to wrath, Apollo and Diana let fly their arrows at the children of Niobe and killed them one after



WINGED VICTORY

another. Finally only the youngest daughter remained. The statue shows Niobe in an agony of grief, trying to shield this last child from death. The story goes that she was unsuccessful, and that Jupiter, in pity for her grief, changed her into a stone which shed tears.

Italy. The history of sculpture in Italy is only a continuance of its story in Greece. It was Greek art, produced by Greek workmen that adorned the palaces of the emperors; and the Roman sculptors, in so far as they had any independent existence, can only claim to have impoverished the ideal they received from Greece. Many of the best-known statues in existence were produced in the Graeco-Roman period; such are the *Borghese Gladiator*, in the Louvre, the *Venus de Medici*, at Florence, and the *Farnese Hercules*, at Naples. From the time of Hadrian (A. D. 138), art rapidly declined, and this debased Roman was the only style employed in Italy

until the revival in the twelfth century. With the general awakening which began in Italy and spread over Europe, came a revival of sculpture, as of all other arts. The stiff, conventional figures of the Middle Ages were invigorated by the spirit of activity which marked the new movement. This revival of sculpture began with Nicola Pisano, who was born at Pisa about 1206 and whose work is preserved in the pulpits which he carved at Pisa and Siena.

He was followed by his son Giovanni Pisano (died 1320), whose great work is the allegorical group in the Campo Santo of Pisa; but both of these sculptors worked on classic lines. Jacopo della Quercia (1374-1438), whose beautiful reliefs, adorning the façade of the church of San Petronio at Bologna, show a feeling for grace not before expressed, was, in a certain sense, the founder of the modern school. Lorenzo Ghiberti (1381-1455) developed a more pictorial style with extraordinary success; but sculpture awaited the advent of Donatello (1386-1468) to find its true direction and to reach its full triumph. Luca della Robbia (1400-1481) and Andrea Verrocchio (1435-1488), the master of Leonardo da Vinci, may also be named. The special tendencies of Italian sculpture may be said to have reached their full expression in the work of Michelangelo (1475-1564). Here all previous efforts to interpret passion and feeling were summed up and concluded. It was toward a complete understanding of the resources of physical expression that all Italian art had been tending, and it is only more fully exhibited in Michelangelo because he was the greatest master that Italy produced. The chief characteristic of his style was the use of colossal, highly developed forms, combined with intense dramatic action. His works are the statues in the chapel of the Medici at Florence, the *Captives*, in the Louvre, the colossal *David*, at Florence, the *Moses*, in Rome, and the *Madonna*, in Bruges.

For a long period after Michelangelo Italian sculptors were content to imitate and sometimes to exaggerate his manner. The only immediate successor of Michelangelo worthy of note is Cellini (1500-1571), of Florence. Lorenzo Bernini (1598-1680), the master of the "barocco" style, exemplifies a straining after grace and elegance by means of affectation. In the eighteenth cen-

tury Italy became the headquarters of the classical revival which spread thence throughout Europe. The leading spirit in this movement was Canova (1757-1822), who, although he failed to restore to his art its earlier masculine strength, at least sought in the study of the antique for greater simplicity and elegance in representation. Canova's most finished productions are notable for an affectionate tenderness of sentiment, rather than imagination, and his figures are never formed after the highest ideal. His most characteristic works are the *Graces*, *Hebe* and the *Cupid and Psyche*; his finest work is the colossal group of *Theseus Slaying a Centaur*, at Vienna. Canova formed Thorwaldsen (1770-1844), the great Danish sculptor, and his name and influence dominated the art of sculpture throughout Europe for many years. Modern Italian sculpture has leaned toward realism, the leading representatives being Gallori, Magni and Ximenes, and of those who avoided this tendency, the best-known are Consani, Albani and Fedi. Further reference to Italian art appears in the article ITALY.

France. The early art of France was influenced by the styles prevailing at that time. Thus the sculptures of French cathedrals show Byzantine, Romanesque and Gothic influences, the finest examples in the last being at Amiens. Awakening in the fifteenth century, it produced, as forerunners of the Renaissance, Bouteillier and Colombe (1431-1514), and in the sixteenth century, Jean Goujon (1530-1572), whose best work is the *Fountain of the Innocents* in Paris, and whose *Diana* shows all the faults and beauties of the style. Cousin (1501-1589), Pilon (1515-1590), Pierre Puget (1622-1694), Coysevox (1640-1720) and Girardon (1630-1715) continued the style which, while aiming at elegance and grace, lost simplicity and roundness. The Danish school which produced Thorwaldsen, owes its rise to French influence. Later yet came Houdon (1741-1828), Bosio (1769-1845), Rude (1785-1855), Barye (1795-1875), a sculptor of animals, and Carpeaux (1827-1875), whose chief work, *La Danse*, is in front of the new opera house in Paris. Among recent artists are Saint Marceaux, Frémiet, Falguière, Mercié, Dalou, Rodin, Dubois, Bartholdi, Barraix, Bartholomé and Rivière. Among these, Rodin (1840-1917) holds the foremost place.

Germany. There was no early school of German sculpture, apart from the general Gothic style of all northern European countries, but with the Renaissance of the fifteenth century arose Adam Krafft (1480-1507) and Peter Vischer, two contemporary sculptors of Nuremberg, and Albert Dürer (1471-1528), painter and sculptor. Then came a break until the rise of the modern school, which owes its existence to the influence of Thorwaldsen. The chief names are Dannecker (1758-1841), with his *Ariadne*, and Shadow (1764-1850), with *Girl Tying Her Sandal*. Rauch (1777-1857) was the real founder of the modern German school. His monument to Frederick the Great, in Berlin, with its many accessory figures, is his finest work, and from his school came Rietschel (1804-1861), Schwanthaler (1802-1848), August Kiss (1802-1865), Bandel (1800-1876) and Drake (1805-1882). Among sculptors of recent fame are Begas, Eberlein, Zumbusch, Kundmann, Weyr, Tilgner, Strasser, Wolff, Hildebrand and Schilling.

England. Of examples of sculpture executed before the eighteenth century England possesses very few. Several tombs exist, and some of the cathedrals, notably Wells, Exeter and Lincoln, possess figures executed presumably by Englishmen at an earlier date. It is not, however, until the reign of Charles I that names of artists appear, notably among them being Nicholas Stone (1586-1647) and Grinling Gibbons (1648-1721), who was the first real artist of the English school. Banks (1735-1805) is the father of ideal English sculpture, but he died unappreciated, leaving John Flaxman (1755-1826) to achieve the task of bringing the classical spirit into English art and of founding the school of the nineteenth century. His love for severe simplicity and true form was imbibed in Rome, and it is best seen in his *Shield of Achilles*, in his *Michael Overcoming Satan* and in his *Cephalus and Aurora*. His most famous pupil was Baily (1788-1867), whose *Eve at the Fountain* is much admired. John Gibson (1791-1866), a pupil of Canova, more properly belongs to the Italian than to the English school, his whole artistic life having been passed in Rome. His finest works are *Psyche Borne by Zephyrs*, *Narcissus*, *Hylas Surprised*, now in the National Gallery, and a large relief of *Christ Blessing Children*. His introduction of color in statuary raised

much discussion. Foley (1818-1874), whose chief work is the equestrian statue of General Outram, now at Calcutta, and Patrick Macdowall (1799-1870), with *Love Triumphant*, are the last of the classic school.

The tendency of sculpture in England at the present day is toward a more original and naturalistic treatment. Alfred Stevens (1817-1875) is the author of the finest decorative work in England, the monument of the Duke of Wellington in Saint Paul's. Of late sculptors who have contributed to England's reputation are Boehm, Woolner, Watts, Leighton, Armstead, Simonds, Brock, Thorneycroft, Ford, Gilbert, Bates, Franklin, Stark and Pomeroy.

Other Countries. The Renaissance began earlier in the *Netherlands* than in the other northern countries and had its center at Dijon, in Burgundy, where a number of important masters were active, among whom was Claux Sluter. In the seventeenth century the school of Antwerp gained prominence and produced such sculptors as François Duquesnoy (1594-1644), and his pupil Artus Quellinus (1609-1688), who showed Italian influence. The eighteenth century noted a decline of sculpture in the Netherlands. *Scandinavia* followed the other nations in the general plan of development. The influence of the Netherlands and France was felt in the eighteenth century. The most important names are Sergel (1740-1814), Bystrom (1783-1848) and Bissen (1798-1868). In the nineteenth century, Thorwaldsen (1770-1884), the great Danish sculptor, stands as the chief exponent of the antique tendency in sculpture.

United States. The first American sculptors of importance are Greenough (1805-1852), a portrait statue artist of marked achievement; Powers, whose *Greek Slave*, *Il Penseroso* and *Proserpine* are well known; Crawford, who produced *American Revolution* and *Indian Chief*. Of later artists in the same group are Palmer Story, Randolph Rogers, John Rogers, Rinehart and Hosmer. These, with the intensely patriotic Henry Kirke Browne and J. Q. A. Ward, form a school of distinctive American art, noticeable both in theme and execution. Others of less fame are Clevenger, Bartholomew, Meade and Launt Thompson. Since about 1875, American sculpture has been greatly influenced by the French, though some of the more important artists have had Ger-

man and Italian training. Of the German-American group, Keyser, of Baltimore, is the most important. Howard Roberts and Levi Warner were among the first to display the French influence. Of recent fame are Augustus Saint Gaudens and Daniel C. French, both masters of the art, whose works have placed them in the front rank of modern sculptors. Notable among the works of French are the bronze statue of Washington, executed as a gift of American citizens to France, and the bronze doors of the Boston Public Library. Saint Gaudens' greatest works are the *Shaw Memorial*, on the Boston Common, and the bronze equestrian statue of Sherman, at the principal entrance of Central Park, New York. The latter is counted among the half-dozen greatest equestrian statues of the world.

Frederick MacMonnies, a pupil of Saint Gaudens, achieved honor, both at home and abroad. Herbert Adams, Partridge, Paul Bartlett, Bitter, Niehaus, Rhind, Proctor, Kemys, Barnard, Borghum, Mulligan and Lorado Taft are among those who have reflected credit upon American sculpture within recent years. On the whole, it may be said of American sculpture that it has started along a path which leads to works of permanent value, namely, independent and consistent labor. It does not disregard the classic forms, but it adds to them an individuality and flexibility which well represents the free and vigorous characters of American life. Such buildings as the Library of Congress at Washington and such decorative achievements as the sculpture of recent expositions testify both to the demand for good art and the ability of American sculptors to meet that demand.

The Study of Statuary in School. It is much to the advantage of the school to have one or more groups of statuary so placed that they may be seen daily by all the pupils. Excellent casts of the best works of the great masters, both ancient and modern, can be procured at such small cost as to make it possible to procure these works of art wherever a desire for them is awakened.

In giving lessons on statuary the teacher will be aided by the following suggestions:

1. If possible, let the lessons be upon the statue instead of upon a photograph of it. However, it is better to give lessons upon the photographs than not to give them at all.
2. Select the subject with care. Some people object to the nude in art, and if the

lessons are to be successful with all pupils these objections must be heeded. Remember that the actions of children appeal to the pupils, and so far as possible choose subjects containing children.

3. If photos must be used, try to have enough so that you can place a copy in the hands of each member of the class. It will be well to distribute these pictures a day or two before giving the first lesson.

4. A statue requires more study than a picture like that chosen for a picture study lesson. Therefore the statue needs more time upon it.

5. At first select only the most striking features. As the class shows the ability to grasp details they can be introduced.

6. Make the lesson short and usually let several days intervene between succeeding lessons. One or at the most two lessons a week are enough for subjects of this sort.

7. When the study is completed, require the pupils in the older classes to write a description of the statue. Pupils in the primary grades should be called upon to give oral descriptions.

The Sun Vow. *The Sun Vow*, the work of Hermon A. McNeil, is the embodiment of a legend long standing among the American Indians. According to this legend, before a youth could be recognized as a man and be allowed to take his place among the warriors of his tribe, he must shoot an arrow at the sun as a test of his strength and skill. If truly aimed and vigorously sped, the arrow went far out of sight in the sun's rays and the youth was deemed worthy. Otherwise he remained longer with the squaws. The group further represents age about to pass from earth and youth about to enter upon the activities of life. This idea is vividly portrayed in the contrast of the figures of the old chief and the boy.

All children are hero worshipers, and boys especially like the heroic. Therefore the group selected for our study will be of special interest to them.

1. Make a careful study of the group and determine what you wish to bring out in the lessons before presenting the subject in class.

2. Introduce the lesson by telling the legend upon which the work is based. Ask the pupils about such customs of the Indians as are especially related to this legend, such as their weapons of warfare and manner of dress. Bring out the fact that in some tribes children and youths were often unclad.

3. Notice the perfect muscular development in the youth.

Call attention to the position of the arm and bow. Are these natural?

4. It may lend interest to the study to have some boys make a bow and arrow and let members of the class take turns in shooting



THE SUN VOW

DEFINITION

The art of imitating living forms in solid substances.

PROCESSES

1. Modeling. The use of clay in the fashioning of the image.
2. Casting.
 - a. Plaster of Paris poured over the model.
 - b. The plaster of Paris removed, and plaster of Paris poured into the new model.
 - c. Reproduction of the plaster cast in marble or stone.

SCULPTURE

FORMS

1. When the object stands free it is said to be in the round.
2. Projecting slightly from a solid surface it is in relief.
3. When cut into or sunk down into the surface it is in intaglio.

Egypt

1. First signs of a developed form of sculpture.
2. Characteristics: Colossal size, stability, symmetry, calm repose, solemnity.
3. Best period from 1450-1000 B. C.

Assyria

1. Best period inferior to that of Egypt.
2. Characteristics: Intense and vigorous spirit. No reference to any ideal beauty, over-laden with detail and ornamentation.
3. Persian sculpture (560-331 B. C.) usually included with Assyrian.

Greece

1. Development rapid and continuous from end of sixth century B. C.
2. Came to perfection in Phidias, in his Athens age.
3. Characteristics of the Periclean age: A perfect balance and combination of elements sublime and human. Sculptures of Parthenon; the Venus of Milo.
4. Period of Scopas, Praxiteles, Lysippos. Soft graceful forms: Venus, Bacchus, Amor.
5. From 323-146 B. C. Dying Gladiator, Apollo Belvedere.
1. A continuance of Grecian sculpture. Decline.
2. The revival came in twelfth century with Nicola Pisano, and came to its triumph in Donatello.
3. Reached its full expression in Michelangelo, who summed up and concluded previous efforts to interpret passion and feeling.
4. Modern sculpture tends to realism.

Italy

France

1. Early art expresses Byzantine, Romanesque and Gothic influences.
2. From fifteenth to eighteenth century: Bouteiller, Colombe, Goujon, Cousin, Pilon, Puget.
3. Eighteenth and nineteenth centuries produced Houdon, Bosio, Rude, Barye, Carpeaux.
4. Recent artists: Saint Marceaux, Frémiet, Daion, Dudois, Bartholdi, Riviere.

Germany

1. The Renaissance produced Kraft, Vischer, Düren.
2. Influence of Thorwaldsen originated the modern school, but the real founder was Rauch. From his school came Rietschel, Schwanthaler, Kiss, Bandel, Drake.
3. Of recent fame: Begas, Eberlein, Zumbusch, Hildebrand, Schilling.
1. Few examples before eighteenth century.

England

2. Gibbons, the first real artist of the English school.
3. Banks, the father of ideal English sculpture, but the school of the nineteenth century was founded by Flaxman.
4. Foley and Macdowell the last names of the classic school.
5. Present tendency toward originality and naturalism.

United States

1. First sculptors of importance: Greenough, Crawford, Palmer, Story, Rogers, Kneehart, Hosmer, Browne, Ward.
2. Since 1875 American sculpture influenced by the French. Howard Roberts, Levi Warner.
3. Of most recent fame: Augustus Saint Gaudens, Daniel C. French. Also, MacMonnies, Adams, Partridge, Bartlett, Bitter, Niehaus, Rhind, Proctor, Kemps, Barnard.

Questions on Sculpture

In what respect does sculpture differ from the other arts of design?

Describe the process of making a statue.

What are the three forms of sculpture?

What are the chief characteristics of Egyptian sculpture? Of Assyrian?

What are the important elements of the art that flourished in Athens during the rule of Pericles?

How did Grecian art change after the Peloponnesian War?

Why is the *Venus de Milo* a masterpiece? Where and when was it discovered?

What great works of art are in the Louvre?

Upon what story is the *Laocoön* based?

What is the story of Niobe, and how has it been portrayed in art?

What are the chief qualities in the work of Michelangelo?

Who was the leading spirit in the classic revival in Italy?

What great sculptors have France and Germany produced?

What did John Flaxman do for English sculpture?

For what is the Danish sculptor Thorwaldsen noted?

What great works has Augustus Saint Gaudens produced?

What suggestions can you give in regard to the study of statuary in schools?

the arrow into the air. Have the other members of the class compare the position of the one shooting with that of the one in the statue.

5. Contrast the angular figure of the old chief with the beautiful muscular figure of the youth.

6. Again contrast the expression of calm resignation of the old man with that of eager expectancy on the countenance of the youth.

Does the old man want the boy to succeed?

What does failure mean to the boy?

Bringing out these contrasts will reveal the remarkable delicacy and skill of the sculptor as well as the thorough knowledge of his subject. It is given to but few to work clay, marble or bronze so delicately as to portray accurately the thoughts and feelings indicated by the countenances in this group.

Call the attention of the older members of the class to the composition. Notice how perfectly the group is balanced. Notice how natural is the position of each figure, and especially the lifelike appearance of the group as a whole. Lead the pupils to see that these characteristics, together with the contrasts to which attention is called above, make this group not only an object of beauty, but a work of the highest art as well.

Related Articles. Consult the following titles for additional information:

GENERAL		
Alto-Relievo	Cast	Mezzo-Relievo
Bas-Relief	Colossus	Parthenon
Bust	Elgin Marbles	Sphinx
Carving	Liberty, Statue of	
SCULPTORS		
Barnard, George	Grey	Phidias
Bartlett, Paul	Way-	Powers, Hiram
land		Praxiteles
Borlum, Gutzon		Robbia, Della
Canova, Antonio		Rodin, Auguste
Cellini, Benvenuto		Rogers, John
Crawford, Thomas		Rogers, Randolph
Donatello		Rude, François
French, Daniel	Chester	Saint Gaudens, Augustus
Ghiberti, Lorenzo		Schilling, Johann
Hosmer, Harriet		Stoss, Veit
Houdon, Jean Antoine		Taft, Lorado
Leighton, Frederick		Thorwaldsen, Bertel
Lysippus		MacMonnies, Frederick
Michelangelo, Buonar-	Watts, George	Freder- ick
Partridge, William		
Ordway		

SCURVY, a disease formerly very prevalent among sailors, because of their being compelled on long voyages to live exclusively upon salt meat and hard bread, with impure water. In recent years the disease on ships is little known, because of better sanitary provisions and more abundant supplies of food. It is due to poor nourishment and is rarely seen, except among the poor and careless. Severe cases of scurvy are accompanied by swellings in different parts of the body and by swollen gums, which become ulcerated and bleed, making it almost impossible to eat. In fact, unless suitably treated, it progresses to exhaustion and death.

Treatment consists in a change of diet. Those who eat plenty of vegetables are never troubled with scurvy. Lemon juice is a valuable preventive and is required by law to be a part of the diet of all sailors in the British navy.

SCUTARI, *sko'tah re*, ALBANIA, a fortified town on the southeastern shore of the Lake of Scutari, situated near the junction of the Drin and Boyana rivers. Before the Balkan Wars the town was the capital of a Turkish vilayet (province), but in 1913 it was captured by the Montenegrins, and by the Treaty of Bucharest was made a part of Albania. In the World War Scutari was

captured by the forces of the central powers, and occupied by them until nearly the close of the war. The town lies on a plain situated about twelve miles from the Adriatic Sea and surrounded on three sides by mountains. In normal years there is a thriving export trade in skins, woolen goods, grain and fish, and cotton manufacture is of considerable importance. Population, estimated, 32,000.

SCYLLA, *sil'ah*, and **CHARYBDIS**, *ka rib'dis*, the former, according to a Greek myth, once a beautiful girl transformed into a six-headed monster because of the jealousy of Circe. She lived under a rock opposite Charybdis and was wont to thrust forth her long necks and in each of her mouths seize one of the crew of every passing vessel. The whirlpool Charybdis, almost opposite the entrance to the harbor of Messina, in Sicily, engulfed every passing vessel when the tide was rushing in. The term, "between Scylla and Charybdis," indicating the difficulty of steering between rock and whirlpool, in modern phraseology has come to mean one of two dangers or evils which must be met.

SEA. See OCEAN.

SEA ANEMONE, *a nem'o ne*, the popular name of a number of sea animals somewhat resembling flowers, from which they derive their name. They are the second lowest among the divisions in the animal kingdom, and with the jellyfish and corals are classed in the branch *Coelenterata* (which see). Sea anemones differ somewhat in size and form, but in general all appear as fleshy cylinders, attached by their bases to rocks or stones, and presenting at their free extremities mouths surrounded by circlets of arms or tentacles. With these tentacles, in some cases exceeding two hundred in number, they seize their food, consisting of a small variety of sea animals, which they paralyze by means of stinging cells, common to this branch of the animal kingdom. The appearance of anemones with their tentacles extended is very beautiful, as they are of all varieties in color and have the appearance of fully-expanded flowers, which, however, close suddenly when touched in any way. Although sea anemones are attached to rocks, they are able to detach themselves and move about at will.

SEA COW. See MANATEE.

SEA CU'CUMBERS, or **HOLOTHURIA**, *hah'lo thu'ri a*, the name of a group of

sea animals, belonging to the same branch as starfishes, sea urchins and sea lilies. They are covered with a tough, leathery skin which is perforated with holes,



SEA CUCUMBER

through which the foot-tentacles protrude (see ECHINODERMS). The animals are capable of contracting and extending themselves to several times their ordinary length, and they will reproduce to an extraordinary degree parts of the body which are cut away or destroyed. They abound along the eastern coast of Asia, and some species are edible. See TREPANG.

SEA HORSE. See HIPPOCAMPUS.

SEA ISLANDS, the small islands which gave their name to a fine variety of cotton called sea-island cotton (referred to in the article COTTON). They are located off the coast of South Carolina, between Charleston and Savannah, are near the shore and separated from it by narrow lagoons. Besides cotton, the islands are well adapted to the cultivation of rice.

SEA KALE, also called **CHAMBE**, is a perennial plant of the Cruciferae family (which see), important as a food on the Atlantic coast of European countries. Its sprouts are blanched and are eaten like asparagus. It is propagated by cuttings or offsets.



SEAL, a warm-blooded, air-breathing, animal that lives both in the water and on the land. A few seals are found in the Caspian Sea and Lake Baikal, but, with these exceptions, all seals are inhabitants of the sea. They are divided into two classes, called *true seals*, which have no external ears, and *eared seals*.

General Description.

The seal has a body which is large at the front and tapers toward the tail, like that of the whales. It has four legs, which are almost covered by the skin of the body, while in place of the feet are fins or flippers. The hind legs are used in swimming, and the fore legs support the animal in an erect position when he is on the land. The mouth is large and is surrounded by numerous feelers, resembling those of the cat. The eyes are large, with an almost human expression, and the ears are small or entirely lacking. The body is covered by thick, woolly fur and long, shining hair, and all is so oily and smooth that it enables the seal to move easily through the water. Seals are air-breathing animals, but they can remain under water for a considerable time. They are expert divers and swimmers, but are exceedingly awkward on land.

Where Seals Live. Seals inhabit the cool waters of the temperate and polar regions and usually return to the same spot year after year to breed. They live in herds, and before they were hunted many of these herds were of enormous size. They frequent rocks in shallow places and icebergs, where they come at breeding time and remain to rear their young. Most species are easily tamed, and they often form great attachment for their keepers and are easily taught ingenious and amusing tricks.

Sealing. The hair seal, which is the common seal of the Atlantic coast, has long, silky hair, and is valuable for its skin and fat, called *blubber*. It is captured in large numbers off Newfoundland, Labrador, Jan Meyen Island and in the White Sea. The inhabitants of Greenland hunt these seals for food and clothing, but they take only a

sufficient number to supply their needs. In many places these seals have been nearly exterminated by hunters, because the skins make good leather, and a valuable oil is extracted from the blubber. The hair-seal industry is really more important than the fur-seal industry, although it has not received as much attention. Finally the danger of exterminating these animals became so imminent that by international agreement the sealing season was restricted, and now about 250,000 seals are taken annually. Under these restrictions the herds seem to maintain their size.

Fur Seal. The fur seal or *sea bear* is highly valued for its fur, which consists of a thick, woolly hair next the skin, very fine and compact, usually of a dark brown color. Over this grows long, coarse hair, which is of some shade of gray. The fur seals are found in the water of the cool temperate or polar regions north and south of the equator, though in the Antarctic regions they are almost extinct.

One herd of seals, which constitutes a distinct species, and that the most important of all the seals, makes its home on the Pribilof Islands, a barren little group in Bering Sea. The study of these animals and their habits, as exhibited on Saint Paul and Saint George,



FUR SEAL

the two largest islands, has been as fascinating to men of science as their capture has been profitable to traders. Every spring

the seals return by thousands to this chosen home, and many of them have specially favored places which they seize each year, and for which they will fight to the death. Each old male, or bull, gathers about him a large number of females, sometimes as many as one hundred, whom he defends against the other bulls, and from whom he exacts the strictest obedience. Through all the long period from spring until August the bulls fast, but the mothers, soon after the young seals, or pups, are born, swim away to the south to find food. The little seals are thus left sometimes for a week, but when the mothers return each is able to distinguish her own pup from all the others of the great group. The pup, too, can tell its own mother's voice, though hundreds or thousands of others may be calling at the same time.

When winter comes, and the storms begin, the seals depart for the south, often going down as far as Lower California; but nowhere do they land and establish a home until with the spring they return to the Pribilof Islands.

The full-grown male fur seal is almost as large as a bear, being often twice as long and weighing four or five times as much as the female. It is the young males which are killed for their fur, for they are the least necessary part of the colony, as the old bulls will not allow them to set up families until they are seven or eight years old, at least. The killing of seals on the Pribilof Islands is carefully regulated by the United States government and only a small number may be killed each year; but in spite of care the number has steadily lessened, and in 1910 killing was forbidden for a period of five years. There are other seal breeding grounds, or rookeries, on other groups of islands, but none are as large or as important as the one on the Pribilof Islands.

The animals are killed by clubbing them when they are on land, where they are comparatively helpless. The skins are salted and packed in the holds of vessels until the close of the season. The beautiful fur is seldom seen in its natural state. As usually prepared, the long gray hair is removed by scraping the pelt on the under side until the roots of this hair, which penetrate the skin farther than those of the fine hair, are cut; then by whipping the pelt the long hair is

easily removed. The skins are then dyed dark brown or almost black, and in this form constitute the ordinary sealskin of commerce. See ELEPHANT SEAL; SEA LION.

SEAL, a sign or mark, but usually an engraved stamp bearing a device or inscription, impressed on paper, metal or wax, and attached to important documents. The seal of country or state must be attached to legislative acts before they can go into effect **GREAT SEAL OF THE UNITED STATES**. This was first adopted by Congress in 1782, and the design was ordered changed by the same body in 1885. On the obverse side is an eagle typifying the government. In one claw the eagle clutches an olive branch and in the other arrows, typifying power in both peace and war. A constellation above denotes the thirteen original states. The motto, "E pluribus unum," signifies unity, and the escutcheon borne unsupported on the breast of the eagle signifies virtue and honor. The reverse side of the seal shows a pyramid, signifying strength. Above is an eye and the motto, "Annuit coeptis," signifying providential direction; below are the date (1776) and the motto, "Vovus ordo seclorum," signifying the beginning of the America Era.

SEA LILIES. See CRINOIDEA.

SEALING WAX, a resinous preparation used for securing folded papers and envelopes and for receiving impressions of seals set to instruments. Ordinary red sealing wax is made from shellac melted with rosin, to which are added Venice turpentine and vermilion. Inferior qualities consist of a proportion of common resin and red lead and black; other colors are produced by substituting appropriate pigments. The invention of sealing wax is credited to the Chinese in the seventh century.

SEA LION, the name given to a large group of eared seals, which, though closely related to the fur seals, are not of value as fur producers. All have long, cylindrical bodies, small, round heads, pointed noses, thick skin, with an under layer of fat for protection against cold, and coarse hair. The individuals of some species have manes. The largest animals, belonging to the Steller group, attain a weight of a thousand pounds and more, and a length of fourteen feet. Their particular habitat is the Northern Pacific. The natives of the Aleutian Islands catch thousands of these seals. They use the flesh for food, the hide for shoes and

boats and the sinews for thread. Another group, called California sea lions, is made up of smaller animals. Sea lions are seen



SEA LION

in large numbers on the Pacific coast cliffs. They are peaceable creatures, but if attacked defend themselves fiercely. They are protected by law, but a few are allowed to be taken for menageries and zoölogical gardens.

SEARCH, RIGHT OF, in international law, the right claimed by a nation at war to authorize the commanders of its lawfully commissioned cruisers to enter and search private merchant vessels of neutral nations on the high seas for the purpose of examining their papers and cargo and to search for enemy property or contraband of war. It is also the right claimed by a nation to search vessels of other nations in order to seize citizens of the former in the service of the latter. England's insistence on the right of search was one of the causes leading to the War of 1812.

SEARCH WARRANT. See **WARRANT**.

SEA ROBIN. See **GURNARD**.

SEA SERPENT, a marine monster, often reported as having been seen, although there is no proof that such a creature exists. Various accounts assert that it is sixty feet or more in length and that it swims with its head and part of its body above water. However, this is generally regarded as a myth, and the explanation is that people have been deluded by the sight of shoals of fish, or logs of wood or seaweed.

SEA'SICKNESS, a nervous attack, produced by the motion of the sea. The symptoms are headache, nausea, vomiting, general weakness and sometimes extreme depression. Usually an attack passes off quickly, as the person becomes accustomed to the sea, and will not recur, at least during the

continuance of the voyage. Some persons are always more or less ill when on the water and become violently so when the sea is rough. Children and aged persons are more frequently exempt than others. Many remedies have been suggested for seasickness, but none seems to be effective in all cases. One should not overload the stomach and should take active exercise in the open air. If, however, the attack is severe, the patient should go to bed for a day or two. However, long confinement in a stateroom is bad, and it very often happens that the attacks will disappear entirely if the patient seeks the open air.

SEASONS, *se'z'nz*, the four periods into which the year is divided by the ever-changing position of the earth in relation to the sun. As the earth revolves about the sun in a nearly circular orbit, its axis at all times points toward the Pole Star and is inclined to the plane of its orbit $23\frac{1}{2}^{\circ}$. Therefore different parts of its surface are at different times of the year exposed to the vertical rays of the sun. Astronomically speaking, in the northern hemisphere spring extends from March 21, the time of the vernal equinox, to the summer solstice, June 21; summer from June 21 to September 21, the time of the autumnal equinox; autumn to December 21, and winter from that date to the beginning of spring. In the southern hemisphere the seasons are reversed, and spring begins September 21. In the torrid zone the changes in the seasons are not marked by differences in temperature, but by wet and dry periods. See **EQUINOX**; **SOLSTICE**.

SEA SQUIRTS, *skwurts*, or **ASCIDIANS**, *as sid'i anz*, a name commonly given to certain low-grade mollusks, so called because of their habit of squirting jets of water when touched or irritated. They somewhat resemble double-necked bottles, and are of leathery or gristly nature. They are found at low water on a



SEA SQUIRTS

Colony on branch of seaweed.

sea beach or are dredged from deep water attached to stones, shells, seaweed and fixed objects. There are numerous species, all of which pass through peculiar phases of development. The young sea squirt resembles the tadpole of the frog, and is free-swimming.



S EATTLE, WASH., the "Queen City," the county seat of King County, and the largest city in the state, is the metropolis, financial, industrial, commercial, shipping and transportation center of the Pacific Northwest. It is the nearest port to Alaska and the Orient. The city occupies a beautiful site, between Puget Sound on the west and Lake Washington on the east. It is built upon a series of hills, which in some places rise to the height of 300 feet and are separated by broad valleys or terraces. The main streets run north and south, and the cross streets, east and west. An

excellent street car system connects all parts of the city and the important suburbs. The streets have been graded at great expense and are well paved. The city has forty-four parks and twenty-four improved playgrounds, the combined area of parks and playgrounds covering 1,818 acres. The most interesting parks are Jefferson Park, which maintains municipal golf links; Seward Park, on Lake Washington; Woodland Park with its athletic field and zoölogical garden; Roosevelt Park, noted for its large trees and mineral springs, and Volunteer Park, from which a fine view of the city and surrounding country may be obtained.

Buildings. Among the important public buildings are a new Roman Catholic Cathedral, costing \$500,000; the First Baptist and First Presbyterian churches; the First Church of Christ Scientist; the King Street passenger station; the O.-W. and Milwaukee station; the Carnegie Library; the Olympic Hotel, built by subscriptions of 3,500 citizens of Seattle; the Washington Hotel, the Providence Hospital and a Federal building; one of the most notable is the L. C. Smith Build-

ing (forty-two stories), the highest building west of New York. Other structures worthy of mention are the Metropolitan Building; Dexter-Horton Building; the Alaska, Hoge and Cobb buildings and the buildings of the Arctic, Sunset and Rainier clubs.

Education. Seattle is the general educational center for the upper Pacific Coast and the home of the University of Washington, which has 7,000 students and is situated on a 582 acre campus, which, in addition to state support, is endowed with 100,000 acres of timber land and ten acres of productive business properties in the heart of Seattle; has eight high schools with 10,700 pupils and 82 elementary and special schools with an attendance of 37,000.

Industries. One-tenth of all the potential hydro-electric energy in the United States is within 350 miles of Seattle. The municipality is developing the Skagit River Project and eventually this will have a total output of 350,000 horse power. The manufacture of lumber is the leading industry, and the lumber and shingle mills are among the largest in the world. Fish packing and canning furnishes employment to a large number of people. More than 100,000 tons of fish and fish products are handled in the city every year. Other important industries are meat packing, the manufacture of flour and machinery, and printing and publishing. The United States navy yard at Bremerton, across the Sound, is an important shipbuilding station, and base for capital ships of the Pacific fleet.

Transportation and Commerce. Seattle has one of the best harbors in the world, and the completion of a canal joining Lake Washington to the Sound has greatly increased the water front. The city is the terminus of the Northern Pacific, the Great Northern, the Chicago, Milwaukee & Saint Paul and the Union Pacific railroads. The Chicago, Burlington & Quincy enters the city over tracks of another line, and the Canadian Pacific and the Grand Trunk Pacific have steamship connection. The Oregon & Washington and other lines connect the city with other Pacific towns.

On the water front are found the extensive docks and railway stations devoted to the handling of freight and to the wholesale trade. This is the most convenient port for all traffic going to Alaska and for much of that between the United States and China

Japan, Hawaii and the Philippine Islands. The largest ocean steamships can reach Seattle docks in all seasons of the year. Public and private waterfront properties are estimated at a value of \$25,000,000 and include the Smith Cove Trans-Pacific Terminals, which are the largest ocean docks in the world.

History. The city occupies the site of a former Indian town. The first settlement by white men was in 1852, and the next year the town was laid out and named after an Indian chief. It had a population of 300 in 1855, but prior to the arrival of the first transcontinental railway in 1884 its growth was slow. In 1889 a fire destroyed the main portion of the city, causing a loss of over \$10,000,000. The discovery of gold in Alaska and the acquisition of the Philippines brought Seattle into prominence as a commercial center, and it has continued to increase in population and wealth ever since. The water work, light and power plants and a part of the street railway lines are owned by the municipality. The Alaska-Yukon-Pacific Exposition was held here in 1909. Seattle has an enviable record in the large percentage of home-owning citizens, low rate of illiteracy and influential churches and schools. Its population in 1900 was 80,000, in 1910, 237,000 and in 1920, 315,652, and the directory estimate of 1924, 355,000.

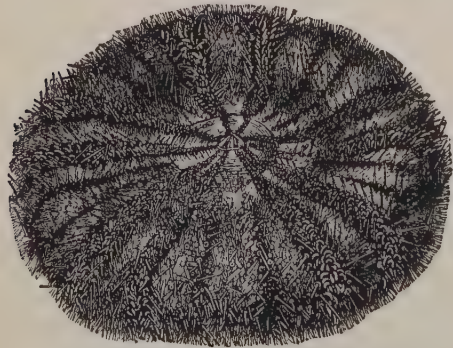
SEA UR'CHIN, or **ECHINUS**, *e ki'nus*, a genus of sea animals, belonging to the same group as the starfish, sea lily and sea cucumber (see ECHINODERMS). The body of the sea urchin is more or less globular and cov-

SEA'WEED, the common name for any plant which grows in water. See ALGAE; KELP.

SEBASTIAN, *se bas'chan*, SAINT (?-288), a Roman soldier and Christian martyr who was put to death by Emperor Diocletian. His position as captain of the Praetorian Guard gave him the coveted opportunity of spreading Christianity and protecting its adherents. Diocletian, on hearing of this, ordered Sebastian to be tied to a stake and shot with arrows. Irene, a Christian, is said to have taken him to her home and cared for him until his wounds were healed. When Sebastian, after his recovery, accused Diocletian of cruelty, the young soldier was condemned to be beaten to death. Paul Veronese, Holbein, Luini and others have immortalized Sebastian in their art.

SEBAS'TOPOL, the chief naval harbor of Southern Russia, situated on the southwestern extremity of the Crimean peninsula, at the head of a four-mile inlet which constitutes one of the best roadsteads of the old Russian Empire. The city occupies a strip of land between two bays at the head of the inlet, on elevated ground. It is strongly fortified, and there are forts north and south of the city and at the entrance to the roadstead. There are extensive docks, and shipbuilding is the principal industry. Wine making is a source of revenue, but there is very little commerce. Near by is the Greek colony of Chersonesus. Sebastopol was founded by Catharine II in 1784, and in 1804 it was made a naval base. The place was the scene of a terrible siege in the Crimean war and of a Turkish bombardment in 1914.

SECESSION, *se sesh'un*, in United States history, a term applied to the withdrawal of a state from the Union. The idea of secession appeared at many times during the early years of the republic, and the right of secession was conceded by many. Every important change in policy gave opportunity for the minority party to suggest secession as a means of compelling the party in power to change its course. It was suggested at the Louisiana Purchase, at the War of 1812, at the passage of the tariff of 1828 and at various times during the slavery controversy. In 1860, after the election of Abraham Lincoln as President, secession was actually carried out, eleven Southern states seceding and forming the Confederate States of America. This brought on the War of Secession, or Civil



UNDER SURFACE OF SEA URCHIN

ered with a shell which is often studded with movable spines. Sea urchins, of which there are many species, are found in shallow water in almost all parts of the world, those of the tropical regions being largest.

War, since which the union has been considered inviolable. See CIVIL WAR IN AMERICA; CONFEDERATE STATES OF AMERICA; UNITED STATES, subhead *History*.

SECORD, LAURA, a Canadian heroine. During the War of 1812 a force of Americans sought to surprise a small British force at Beaver Dam. News of this plan reached James Secord, a wounded militia officer then living in Queenstown.

As he himself was unable to warn the British commander, his wife undertook the dangerous mission. Driving a cow before her until she reached the woods, in order that the enemy might not suspect her purpose, she then set out on her solitary tramp of twenty miles through the dense forest. After an exhausting day, during which she was in constant danger from hostile Indians and Americans, she brought the news to the defenders of Beaver Dam. The British forces were now prepared for attack and when the Americans approached, the English immediately took the offensive and forced the Americans to surrender. While the battle in itself was not of great significance, it will live in history for the heroism of Laura Secord.



THE LAURA SECORD
MONUMENT, AT
LUNDY'S LANE
CEMETERY

SECRETARY BIRD, a South African bird of prey, deriving its popular name from the peculiar plumes which project from the back and sides of its head, giving to it the appearance of having bundles of old-fashioned quill pens stuck behind each ear. The bird has very long legs, and its stands nearly four feet in height. Though somewhat resembling a heron in general appearance, it is more closely related to the vulture, and as it kills rats, mice, troublesome insects and even snakes, it is protected by law.

SECRETARY OF STATE. See STATE, DEPARTMENT OF.

SECRETION, in animal physiology, the separation of certain substances from the blood and the forming of them into special fluids, such as bile, saliva, mucus. Secretion is the work of organs of various form and

structure, but all may be classified as membranes or glands. Secretions are of two kinds, those that have a special work to do, known as *true secretions*, as the saliva and bile; and those that are discharged from the body as worthless or harmful, known as *excretions*. The latter require no special cells, as they exist in the blood and must be separated from it. If an excretory organ becomes useless, some other organ will do its work, but if an organ of secretion be removed, its product is no longer found in the system. See GLANDS; MEMBRANES.

SECRET SERVICE, that branch of the government whose duty it is to detect criminal and fraudulent practices against the government. In most foreign governments this service is in the hands of a separate department, but in the United States each of the several executive departments has its own secret service. The most important divisions are those connected with the Treasury and the Department of Justice. The Treasury division is engaged chiefly in the detecting and arresting of coin and note counterfeiters and in preventing the violation of revenue laws.

The duties of the division connected with the Department of Justice consist in detecting plots against the government, and in discovering and arresting those who persist in violating the laws of the United States in other ways than by defrauding the government financially. During the World War the labors of this division were very strenuous, and the skill displayed by its members in detecting German propaganda, and in discovering and arresting German agents proved the high degree of efficiency which the Secret Service in the United States has attained.

SECRET SOCIETIES. See FRATERNAL SOCIETIES.

SECULAR GAMES, a festival anciently celebrated at Rome at irregular periods and not, as their name would seem to indicate, at the commencement of a new *saeculum*, or generation. Nothing of their origin is known except that they were celebrated in honor of Pluto and Proserpina, to avert from the state some imminent catastrophe. Down the ages long intervals elapsed between the various celebrations.

SEDALIA, Mo., the county seat of Pettis County, 100 miles east of Kansas City, on the Missouri, Kansas & Texas and the Mis-

souri Pacific railroads. The city is situated on a plain almost a thousand feet above sea level, in an agricultural region containing, also, deposits of zinc, iron, lead, fire clay, emery and limestone. Repair shops of the Missouri Pacific are located here; these employ nearly 2,000 men. There are also foundries, machine shops, implement works, woolen mills, a meat-packing plant, flour mills, grain elevators, broom factories, a clothing factory and manufactories of agricultural implements. The principal structures are a Federal building, courthouse, high school, municipal buildings, a Y. M. C. A., a Carnegie Library, a railroad hospital and two that are private. The city has a telegraph school, George R. Smith College for colored students, a convent and other institutions. The city was laid out by General George R. Smith in 1861, and was a military post during the Civil War. It was incorporated in 1864, and was chartered as a city in 1889. Population, 1910, 17, 822; in 1920, 21,144, a gain of 19 per cent.

SEDAN, *se dahn'* **BATTLE OF**, the decisive battle of the Franco-German War, fought September 1, 1870, at Sedan, a fortified town 164 miles northeast of Paris. Marshal MacMahon, on his way to relieve Bazaine at Metz, was forced by the Germans to take refuge in the fortress of Sedan, which was then surrounded by the enemy. The French issued from their position and began battle; driven back to the town of Sedan, after gallant fighting they were finally forced to surrender. Emperor Napoleon III and over 85,000 men were made prisoners. It was the capture of Sedan which led to the overthrow of the Second Empire in France. See **FRANCE**, subhead *History*; **FRANCO-GERMAN WAR**.

SEDATIVE, *sed'a tiv*, a drug which has a quieting influence upon a part or the whole of the nervous system or any of the organs of the body. General sedatives include chloroform, ether and the hypnotics; local sedatives are cold, heat, cocaine, opium, aconite, etc. Sedatives vary in their effects. In many instances drugs that act as sedatives upon one organ are irritants upon another; and often when small doses are sedatives, large doses excite or irritate. See **NARCOTIC**; **ANESTHETIC**, and various articles on the drugs.

SEDGES, *sej'es*, a term promiscuously applied to many marshy plants which look like

grasses but differ from them in having triangular stems, and in their flowers, which resemble minute lilies in form and structure. Most of the hay cut in swampy places is made up of sedges, which are not as succulent nor as nutritious as the grasses. There are numerous species of the sedge, distributed throughout all parts of the world, so nearly alike that only botanists can distinguish them. The Egyptian papyrus belongs to this family.

SEED DISPERSAL. If no seeds ever grew except those that are gathered and carefully planted, only a very small part of the earth would have green things growing upon it. But fortunately for the plants, most of them do not have to depend on people to carry their seeds about. They are provided with all kinds of ingenious apparatus to do the work for them. If the tiny dandelion seed had to depend upon itself it would never get far; it would probably stay on the head of the stalk until that withered, and then it would fall to the ground. But the dandelion seed has white, feathery wings. A puff of wind takes up a number of the seeds with their feather tops and carries them away, sometimes perhaps, bearing them for miles before it drops them. The thistle and the milkweed seed have the same kind of little white hairs, which help them to find their way about. The elm and the ash and the maple have winged fruits, but these wings are different. They are made of a sort of membrane which looks more or less like the inside wing of a grasshopper. However, they do just the same duty as the fluffy wings of the milkweed—they help the wind to carry the seed and scatter it everywhere. Those who live in the country where there are open stretches may see dried-up plants, rolled up almost into a ball, blowing about the prairies and piling themselves up by fences. These plants, which have broken off near the ground, are known as tumbleweeds, and they are doing just what the pansy does when its seed-pods shoot open—scattering their seed. The seeds are held rather firmly by the plant, so that they do not all fall out at once, but are strewn over long distances. This is the way the Russian thistle and the pigweed and the ticklegrass spread themselves over so much ground, for those three troublesome plants are all tumbleweeds. The seeds of the cocklebur are in the burs, and when those troublesome things stick to people or to animals the seeds are scattered. All the other kinds of

SEED TRAVELERS



Most plants grow seeds. But the seeds must be scattered. Some seeds, like the dandelion's, the milkweed's or the thistle's, may travel for miles with dainty parachute before the breezes let them down to rest on the earth.

The autumn winds engage in many a foot-ball game, kicking the tumble-weeds over and over across the prairies, making "touch-downs" against fences or clumps of brush. But in the "scrimmages" of the games the weeds have thrown far and wide their precious seeds.



The seed of the maple and the ash is fitted with filmy wing like the dragon-fly. Upon this wing it flies away before the wind till dropped in some sheltered nook, perhaps far from the parent tree.

The sedges beside river or lake ripen their seeds in little air-filled balloons. These drop to the surface of the water and are carried by current or winds till caught in some tiny cove. Here the balloons burst open and drop the seeds into the mud.

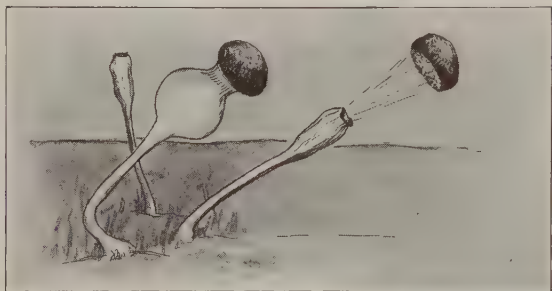


Ever plant fern seed? Hardly. Ferns don't have seed. This drawing shows what they do have. Read all about it. Look up Ferns and Spores. Find some ferns growing and examine closely the under side of the leaves.



Shore and marsh birds carry many seeds in the mud that clings to their feet. Other birds carry off berries and small fruits and drop the seeds in many places a long distance away.

Then the plants which stick out sharp little fingers or barbed hooks to catch the wool of sheep or little boys' clothing. How many free rides they get, and how well they distribute their seeds.



The "sling-fruits" plants, such as the morning-glory, pansy, "touch-me-not", burst their seed-cases at the right time, and sling or shoot the seeds to a little distance. Some lower forms like the pilobolus blow their seed-cases as shown here.

Some plants don't want to depend entirely on seed. The strawberry travels with a hop, skip and a jump, sending out one runner after another and dropping rootlets into the earth here and there.



The banana, poor fellow, has no seeds at all. Only little dots of "used-to-be" seeds. He must depend on friendly hands to transplant his sprouts.

bur plants, the sand bur, the sticktight, the burdock, have their seeds carried about for them in the same manner.

In these ways and in other ways seeds are scattered, and if all plants that spring from

Seed Construction. Each seed consists of an embryo and a supply of food, protected by a more or less hardened coat. The embryo is a minute plant, one part of which has the power to grow upward to the light and air,



SEED-SCATTERING DEVICES

1. Tumbleweed. 2. Milkweed. 3. Cocklebur. 4. Winged seeds of maple.

seeds matured the earth would be choked with vegetation. For example, a morning-glory has just about an average number of seeds—three thousand to a single healthy plant. If all of these seeds were planted, and grew, there would be nine million plants the next year. The following year there would be twenty-seven billion plants, and the year after that eighty-one trillion. At this rate it would not take the descendants of a single morning-glory very long to cover much of the earth. Indeed, it is a well-known fact that if there were no check to the growing of plants, the whole surface of the land would soon be covered with vegetation denser than that in the thickest tropical jungle—so dense that men and animals could not get through. In the struggle for existence, however, the weaker plants are crowded out, and a proper balance is maintained. See BOTANY.

SEEDER. See SOWING MACHINE.

SEEDS, the name in botany given to the ripened ovules of plants. Sometimes they are called "plant babies," as each contains the nucleus of a tiny plant.

where it develops leaves and flowers; the other part has the power to develop roots, which grow downward into the darkness of the soil in search of food and moisture. In



SEEDS

- 1, squirting cucumber; 2, bidens; a, the full head b, fruit enlarged; 3, maple; 4, geranium; 5, clematis; 6, cocklebur; 7, dandelion.

the seed the food supplies are in some cases placed around the embryo, while in others they are stored in the embryo itself. The

coverings of the seeds are so marked that a person knowing them can easily recognize the species from which they came.

Some seeds are hard and dry, or stony; others develop appendages, such as wings, or silky hair, evidently intended to aid in their distribution. In a few species there is an extra covering, called an *aril*, which is either fleshy or sacklike, as may be seen in the mace of a nutmeg.

Seed Testing. To secure the best prospects for a good crop, successful farmers test their seeds before planting. Professor Nobbe established the first laboratory for testing seeds at Tharand, Saxony, in 1869. Since that time laboratories have been established in most European countries, where in numerous instances the quality of the seed is under governmental control. Seed testing laboratories are found in the United States in connection with the national Department of Agriculture and many individual state experiment stations.

A simple device for seed testing consists of two plates of the same size. A piece of blotting paper marked off into squares two inches in diameter is placed in one plate. Enough water is poured into the plate to moisten the paper, and ten seeds to be tested are dropped in each square. Over these another piece of blotting paper, on a damp cloth, is placed, and this is covered by turning the second plate over the first. The blotter must be kept moist, and the plates set where the temperature will be about the same as that of the soil at the time of planting. In eight or ten days the seed should have germinated (sprouted). The number of seeds that have germinated in each square should be counted, and thus the percentage of good seed in the lot from which the seeds were taken is estimated. See SEED DISPERSAL.

SEEGER, ALAN (1888-1916), an American poet who made one of the most notable contributions to the poetry of the World War in his splendid lyric, *I Have a Rendezvous with Death*. He was born in New York City, but spent part of his boyhood in the City of Mexico. In 1910 he was graduated at Harvard University, and two years later went to Paris, where he continued to write poetry, which had been begun in his college days. In August, 1914, shortly after the outbreak of the World War, he enlisted in the Foreign Legion of France. The young poet spent many weary months in drilling

and becoming inured to the monotony of trench life, but in the spring of 1915 he took part in the Battle of Champagne. After this engagement his regiment passed to the rear and was not sent to the front until May, 1916. On July 4 the Legion was ordered to clear the enemy out of the village of Belloy-en-Santerre, and in the first advance Seeger fell wounded. The next morning his dead body was found on the battlefield.

Alan Seeger's poems were published in America in December, 1916. They include his early verse, entitled *Juvenilia*, a number of sonnets and translations of Italian classics, and his war poems. His most famous lyric appears below. Another notable poem, *Ode in Memory of the American Volunteers Fallen for France*, was written in two days in the midst of trench hardships.

The poem that immortalized Seeger is given in full below:

I have a rendezvous with Death
At some disputed barricade,
When Spring comes back with rustling shade
And apple blossoms fill the air—
I have a rendezvous with Death
When Spring brings back blue days and fair.

It may be he shall take my hand
And lead me into his dark land
And close my eyes and quench my breath—
It may be I shall pass him still.
I have a rendezvous with Death
On some scarred slope of battered hill,
When Spring comes round again this year
And the first meadow-flowers appear.

God knows 'twere better to be deep
Pillowed in silk and scented down,
Where Love throbs out in blissful sleep,
Pulse nigh to pulse, and breath to breath,
Where hushed awakenings are dear. * * *
But I've a rendezvous with Death
At midnight in some flaming town,
When Spring trips north again this year,
And I to my pledged word am true,
I shall not fail that rendezvous.

SEIDLITZ, *sed'lits*, **POWDERS**, a medicine, named after the Seidlitz spa in Bohemia. These powders are usually put up in blue and white papers, the blue containing tartrate of soda and potash (Rochelle salt), with bicarbonate of soda; and the white, tartaric acid. The contents of the blue paper are dissolved in half a tumbler of water, and the acid powder is then added. The draught is taken during the effervescence, which begins at once. The medicine is mildly laxative.

SEIGNIORAGE, *seen'yer ayj*, a royalty or prerogative of the sovereign whereby an allowance of gold or silver, brought to a mint

in the mass to be exchanged for coin, is claimed. In modern times the meaning has not changed. Any person owning gold in any form may take it to a government mint and exchange it for gold coin, ounce for ounce, except that enough is deducted to pay for coining the bullion. This deduction is seigniorage.

SEINE, *sayn*, the most picturesque river of France and its most important trade route. The city of Paris lies on its banks. It rises in the department of Côte-d'Or, flows north-northwest and enters the English channel between Havre and Honfleur. Because of its circuitous course, it is 475 miles long, and it is navigable for 350 miles. Its mouth is an estuary six miles wide, where is situated the city of Havre. To enhance its commercial value numerous locks and canals have been constructed to connect it with the Scheldt, the Meuse, the Rhine, the Rhone and the Loire. Within recent years the Seine has at times overflowed its banks, and Paris has suffered severely from floods.

SEISMOGRAPH, *size'mo graf*, an instrument for measuring the force and direction of earthquakes and other earth movements. The essential part of a seismograph is a pendulum so delicately suspended that it is unaffected by earth movements. The record is made by the movement of the surface beneath it. Some types of the apparatus are so constructed that the record is produced photographically upon a moving piece of sensitized paper or film; others are so made that a stylus traces the record on smoked paper attached to a movable cylinder. So sensitive is this delicate little instrument that it can record at Rio Janiero earth disturbances in Japan, on the opposite side of the globe.

SELENE, *se le' ne*, in Greek mythology, the goddess of the moon, daughter of Hyperion and Thea and sister of Helios (the sun) and Eos (the dawn). She was also called Phoebe, and in later times was identified with Artemis. In art she was often represented as a beautiful woman with large wings and a flowing robe, and wearing a coronet.

SELENIUM, a rare chemical element, discovered by Berzelius in 1817 in the refuse of a sulphuric acid manufactory near Fahlun, in Sweden. It occurs in several minerals, chiefly in combination with sulphur, copper, lead, mercury and silver, and is closely related in its general chemical properties to sulphur and tellurium. Selenium takes fire

when heated to a tolerably high temperature in air or in oxygen, burning with a blue flame and a disagreeable odor. With hydrogen selenium forms the very disagreeably smelling gas, *seleniureted hydrogen*, the analogue of *sulphuretted hydrogen*. In metallic form it is a conductor of electricity, the power of which is increased by sunlight.

SELF-DENY'ING ORDINANCE, *awr'di-nans*, an enactment passed by the British Parliament in 1645, decreeing the resignation of all members of that body who had held any civil or military office during the Civil War between Charles I and Parliament. Its object was to remove inefficient commanders for the remodeled army and to give control of the army to radical Independents rather than to Presbyterians. Cromwell, who was a member of Parliament and an officer in the army, was excepted and reappointed to the command of the cavalry as lieutenant-general.

SELJUKS, *sel jooks'*, a Turkish dynasty very powerful in Asia in the eleventh and twelfth centuries, so named after Seljuk, a chieftain of the Ghuz Turks. Persia was conquered by the Ghuz Turks in 1030, and this formed the nucleus of the empire, which later extended over Armenia, Turkestan, Syria and Asia Minor. In the First and Second Crusades, the Christians came into conflict with the Seljuks because of their cruelty toward pilgrims to the Holy Land (see *CRUSADES*). The Seljuk dynasties held sway until the end of the thirteenth century, the Ottoman Empire in Asia being founded upon the ruins of the Seljuk Empire. Omar Khayyam (which see) flourished during the period of Seljuk supremacy.

SELKIRK, ALEXANDER (1676-1723), a Scotch adventurer, whose experiences on an uninhabited island inspired the story of *Robinson Crusoe*. He took part in buccaneering expeditions in the Southern Pacific, and in consequence of a quarrel with his captain he was put ashore, at his own request, on the island of Juan Fernandez, off the coast of Chile. There he lived alone for four years and four months, until he was rescued by the captain of a privateer. He returned home in 1712, and his adventures became known to the public. He afterward rose to the rank of lieutenant in the navy. Defoe's *Robinson Crusoe* appeared in 1719, but Crusoe's experiences have but little in common with those of Selkirk. See *ROBINSON CRUSOE*; *JUAN FERNANDEZ*, for illustration.

SELKIRK MOUNTAINS, a range about 200 miles long and eighty miles wide, situated in the southeastern part of British Columbia and noted for its great glaciers and the rugged magnificence of its scenery. The range is west of the Rockies and extends from the United States boundary to the great loop of the Columbia River. Its highest peaks are Mount Sir Sandford, 11,634 feet, and Mount Sir Donald, 10,645 feet. Gold, silver, copper, zinc, mercury, coal and marble have been found here. The range has been named in honor of Thomas Douglas, Earl of Selkirk (which see).

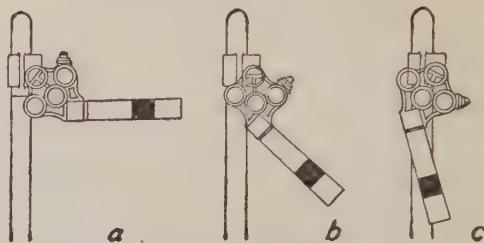
SELMA, ALA., the county seat of Dallas County, fifty miles west of Montgomery, on the Alabama river at the head of navigation, having two steamers weekly to Mobile. It is on the Louisville & Nashville, the Southern, and the Western of Alabama railroads. The city is in a cotton-growing region and contains cotton, cottonseed-oil, flour and planing mills, railroad shops, machine shops and other factories. The Alabama Baptist Colored University is located here, and the city has Dallas Academy, a Carnegie Library, a Y. M. C. A. and a county courthouse. There is a fine bridge across the river. The first settlement was made in 1823. Population, 1910, 13,649; in 1920, 15,607.

SELVAS, *sel'vas*, a stretch of dense woodland plains of the Amazon Valley, in South America, extending from Northern Brazil to the southern part of Venezuela. Brazil-nut, cacao, wax-palm, and other varieties of trees grow in abundance amid dense tangles of cacti, orchids and creeping tropic vines, while from this great forest Brazil exports in addition to many kinds of valuable wood, immense quantities of rubber and bamboo.

SEMAPHORE, *sem'a for*, a device used for signaling in navies, in the army and on railroads. Before the invention of the telegraph, many kinds of semaphores were in use, but electric communication now has rendered them unnecessary in many instances.

The simplest form of semaphore is that employed on railways. It consists of an upright standard, from three to eighteen or twenty feet in height, as conditions necessitate, to the top of which one or more boards, called *arms*, are attached. These arms are fastened to the standard so they can be raised or lowered from the office of the telegraph operator. The long arm is usually painted red or white, and the short arm contains an

iron frame, in which are placed red and green glasses, one above the other. When the arm of the semaphore is dropped, it indicates a clear track; if raised to an angle of 45°, it



SEMAPHORE

a, stop; b, caution, go slowly; c, way clear, go ahead.

indicates caution; if raised to a horizontal position, it indicates that the train should stop. At night the colored glasses in the short arm give the necessary signals. When the arm is dropped, a white light is shown; at an angle of 45°, a green light; and when in horizontal position, a red light. See RAILROAD.

SEMBRICH, *zem'brik*, MARCELLA (1858-), an operatic soprano whose real name is MARCELLINE KOCHANSKA, was born at Lemberg, in Galicia. At first she studied violin and piano, but upon the discovery of her remarkable voice, she began to study at Milan. After a successful operatic début at Athens in 1877, she became the leading soprano in the Dresden court theater, where she remained until 1880. During the next five years she received great ovations in her frequent concert tours to England and America. Since 1889 she has resided in Dresden, continuing her public work, largely in recitals in Europe and America, although appearing as the leading soprano for several seasons at the Metropolitan Opera House, New York. Critics have accorded Sembrich unanimous praise for the purity and flexibility of her voice.

SEMELE, *sem'e le*, in Greek mythology, a daughter of Cadmus, beloved by Jupiter. Jealous of her husband, Juno persuaded Semele to entreat her lover to attend her with the majesty in which he appeared on Olympus. As he had sworn to gratify her every wish, Jupiter, though horrified at this request, came to her accompanied by lightnings and thunderbolts, which were too powerful for a mortal, and Semele was instantly consumed by fire. Bacchus, the god of wine, was her son by Jupiter.

SEMINOLE, *sem'i nohl*, a Muskogean tribe of Indians who originally lived in Florida. They consisted chiefly of immigrants from the Lower Creek towns on the Chattahoochee River, and took their present name about 1775. The Seminoles first came into conflict with the United States in 1817, when General Andrew Jackson invaded their territory. After the cession of Florida to the United States in 1819, a treaty was made with them providing for their removal west of the Mississippi River, but a large number, under the leadership of the celebrated Osceola (which see), refused to be bound by the treaty. Their heroic efforts to hold their territory and to prevent themselves from being removed west of the Mississippi were so successful that it was only after a war of seven years (1835-1842), which cost the United States \$10,000,000 and 2,000 lives, that the Seminoles were transported to what is now Oklahoma and finally settled there, where their descendants are American citizens. A few still remain in Florida, where they are to be placed on a small reservation, because of the draining of the swamps.

SEMIAMIS, *se mir'a mis*, a queen of Assyria, whose history is a mingling of fact and fable. Tradition credits her as the founder of Babylon and the conqueror of Persia and Egypt. According to the story, she was a daughter of the fish goddess Derceto by a Syrian youth. When deserted by her mother, she was fed by doves until discovered by the chief of the royal shepherds, who adopted her. Her beauty attracted King Ninus of Assyria, who made her his wife. Upon the death of her husband she reigned gloriously for forty-two years, when she was deposed by her son, when she disappeared. The hanging gardens of Babylon are attributed to her. Catharine II of Russia was called the Semiramis of the North.

SEMITES, *sem'ites*, who together with the Hamites and the Aryans constitute the three great divisions of the white race, are a west-Asiatic group of people, including the Hebrews, Assyrians, Chaldeans, Carthaginians, Arabians, Babylonians, Phoenicians and various other peoples, closely akin in physical and mental characteristics, religion and language. The name is derived from that of Shem, the son of Noah, but is not rightly applied to all of the peoples who are given in *Genesis* X as the descendants of Shem. Judaism, Christianity and Mohammedanism

had their origin with the Semitic races; our alphabet comes from the Phoenicians.

SEMITIC LANGUAGES form an important linguistic family, usually divided into a northern and a southern section. The northern group includes the ancient dialects of Assyria and Babylonia (recovered by means of the cuneiform inscriptions), the Hebrew, the Phoenician and the Aramaic. Of these, the Hebrew alone is extant as a spoken language. The most important of the south Semitic tongues, and the only one now in extensive use is the Arabic. To this southern branch belongs also the Ethiopic, or ancient ecclesiastical language of Abyssinia. The greatest literary attainments of the Semites are the Bible and the Mohammedan *Koran*.

Related Articles. Consult the following titles for additional information:

Alphabet	Hebrew Language
Christianity	and Literature
Cuneiform	Jews
Inscriptions	Mohammedanism

SEMMES, *semz*, RAPHAEL (1809-1877), an American naval officer who commanded the *Alabama*, the famous Confederate vessel of the Civil War, was born in Charles County, Md. He entered the navy in 1832, having previously studied law, took part in the Mexican War, and at the outbreak of the Civil War joined the Confederate service. As commander of the *Sumter*, and later of the *Alabama*, he captured many prizes (see ALABAMA, THE). Semmes was later placed in charge of the James River squadron. He was imprisoned after the war, but gained his liberty at the amnesty. He then devoted himself to his law practice and to the writing of several books, notably *Service Afloat and Ashore*, *Cruise of the Alabama and Sumter* and *Campaign of General Scott in the Valley of Mexico*.

SENATE, originally the supreme legislative body of ancient Rome, first instituted, according to tradition, by Romulus. Under the Republic the consuls, the consular tribunes and the censors had the power of choosing the senators; but they were restricted to those who had previously held magistracies, and as the magistrates were chosen by popular election, the senate was ultimately a representative body. In the administration of affairs the senate was supreme, and during national crises it could invest the consuls with absolute and dictatorial authority. Its numbers varied from 100 to 1,000, being often increased or diminished to suit the wishes of various emperors and dictators.

In modern times the term is applied to the upper, or less numerous, branch of the legislature in various countries, as in the United States, Canada, France, in most of the separate states of the Union and in some of the Swiss cantons. It is also used to designate the governing body of certain universities. See below.

SENATE OF THE UNITED STATES, the upper and smaller branch of the national Congress. The Constitution of the United States, in Article I and in Amendment XVII, states the fundamental law under which the body is organized.

There are two Senators from each of the forty-eight states of the Union. It was intended that they should represent the states in Congress; therefore the Constitution placed upon the state legislatures the duty of electing them. The Seventeenth Amendment, adopted in 1912, took this privilege from the legislatures and vested their election directly with the voters. They yet represent the sovereign states, but are probably more responsive to the wishes of the people by the present manner of election. The term of a Senator is six years; one-third of the Senators retire every two years, on the 4th of March, so the Senate, unlike the House of Representatives, is a continuous body.

The powers and duties of Senators are co-ordinate with those of Representatives, in most respects. The Senate cannot originate revenue bills, the initiative resting with the House. It has the sole power to sit as a court to try impeachment cases after the House has voted impeachment of an officer of the government. The Senate is one arm of the treaty-making power of the government, for it must approve all treaties made by the executive department before they can become effective. In other respects the powers of the two houses are equal.

The presiding officer of the Senate is the Vice-President of the United States. Not being a member of the body, he can vote only in case of a tie. The Senators choose one of their own members, known as president *pro tempore*, to preside when the Vice-President is absent. The salary of the president *pro tempore* is \$12,000, the same as that of the Vice-President; all other Senators receive \$7,500.

Related Articles. Consult the following titles for additional information:

Congress	Representatives,
Constitution of the	House of
United States	Vice-President

SENECA, *sen'ē ka*, a tribe of American Indians, who when first known inhabited the western part of New York state between Seneca Lake and the Genesee River. They were the largest and most powerful tribe in the Iroquois federation known as the Five Nations (which see). They conquered the Erie and the Neutral Nation and absorbed the remnants of those tribes, about 1650, then extended their settlements into the country west of Lake Erie and southward along the Allegheny River. In the Revolutionary War they supported the British. About 2,500 now live on their reservation in New York, and a few are found in Oklahoma and Ontario. They have adopted the dress and customs of civilization.

SENECA, LUCIUS ANNAEUS (about 4 B. C. -A. D. 65), a Roman philosopher who taught the doctrine of the Stoics, and one of the most brilliant men of letters of his time. He was born at Corduba (Cordova). When quite young he studied in Rome, where he made rapid advance under the tuition of his father. On his recall from Corsica, where he had been banished for eight years, he was made praetor, and was appointed one of the tutors of Emperor Nero. For a few years Seneca exerted a strong influence over his wayward pupil, but eventually only jealousy and hatred were engendered. After Nero had drawn Seneca into a conspiracy, he was forced by Nero to commit suicide. Seneca's extant works comprise moral treatises on *Anger*; on *Providence*; on *Tranquillity of Mind*; on the *Steadfastness of the Wise Man*; on *Clemency*, addressed to Nero; seven books on *Benefits*; seven on investigations of nature, and twenty books of moral letters. The tragedies which bear Seneca's name are inferior to his prose writings. See STOICISM.

SENECA LAKE, the largest of the group known as the Finger Lakes, in the western part of New York, and a favored summer resort because of its scenic attractions, notably Watkins Glen and Cayuga Lake Park. The lake is thirty-seven miles long, from two to four miles wide, and 630 feet deep. Seneca Lake flows into Lake Ontario, through Seneca and Oswego rivers, and is joined by a canal to the Erie canal. See NEW YORK STATE BARGE CANAL.

SENEGAL, *sen e gawl'*, a river of Africa, on the southwestern border of the Sahara Desert. It rises near the sources of the Niger, from which its sources are separated

by the highlands of the Mandingo country. Its course is northwest and west through the Senegambia and Niger territories, and it enters a lagoon on the Atlantic Ocean near the town of Saint-Louis. The river has two picturesque cataracts, Guine and Felu. The basin drained by the Senegal is hot and unhealthful. About 700 of its 1,000 miles are navigable, but much of its course is dangerous to shipping.

SENEGAL, a French colony in West Africa, extending from the Gambia River on the south to the Senegal on the north, and from the Atlantic Ocean eastward somewhat indefinitely. It has an area of about 74,000 square miles and a population of about 1,250,000, of which 4,600 are whites. The region is mostly low, and in some sections the soil is unfertile, but in some portions of the Senegal Valley there are luxuriant forests. The climate is hot and unhealthful. The products consist of cocoanuts, rubber, raisins, millet and maize. The capital is Saint-Louis which is connected by railway with Dakar and Rufisque. There are no manufactures, and the commerce is comparatively unimportant. See FRENCH WEST AFRICA.

SENEGAM'BIA, a territory in West Africa, now known as Senegal (which see).

SENNACHERIB, *seh nak'e rib*, an Assyrian king, son of Sargon, who reigned from 705 to 681 B. C. He suppressed the revolt of the Babylonians, reduced part of Media, exacted tribute from Tyre and other Phœnician cities, advanced upon Philistia and Egypt and finally proceeded against Hezekiah, king of Judah, who had revolted. Yielding to panic, Hezekiah paid the tribute exacted, but when Sennacherib again invaded Judah, a miraculous visitation caused the death of thousands of his troops. Sennacherib built the embankment of the Tigris and made canals and water courses, but his architectural triumph was the palace of Koyunjik, which covered eight acres.

SENSA'TION, a mental impression received through the excitation of a sensory nerve. The conditions necessary to a sensation are (1) a stimulus acting upon the ends of a sensory nerve; (2) the transmission of this stimulus to the nerve center with which the excited nerve is connected; (3) reaction of the brain upon the stimulus. Sensations are divided into two classes, general and special. General sensations are those which are related to the welfare of the body and serve

as warnings or stimuli to action. Hunger, thirst and fatigue are good illustrations. Special sensations are those received through the organs of special sense and are more directly connected with mental states than are general sensations.

Intensity. The intensity of a sensation depends upon two classes of conditions—those which are external and those which are internal. The external conditions are (1) the intensity of the stimulus; for instance, the sensation from the light of a candle is not as intense as that from an electric light; (2) the mass or amount of the stimulus; a boy derives more pleasure from a spoonful of sugar than from a few grains; (3) newness of surroundings; because everything is new to him the child has stronger sensations from a certain stimulus than does the adult; (4) prolongation of the stimulus; the intensity is weakened by the prolongation of the stimulus beyond a given time. An odor which is at first keen is scarcely perceived after a few moments. Looking continually at a bright object fatigues the eye, and the color appears more dim, and listening continually to a monotonous sound lessens its intensity.

The internal conditions are (1) attention; sensation becomes more vivid if we give it our attention; (2) condition of mind and body; sensations are weakened by weariness and by some diseases, while they are sometimes intensified by such diseases as irritate the nerves; (3) contrast; sudden changes from one extreme to another increase the intensity, as in passing from a dark room to one brilliantly lighted, or in the hearing of a loud sound when one is in quietude.

Development. At birth the organs of special sense are dormant, and they develop slowly. The best authorities consider touch as the fundamental sense, and it is the one earliest developed. Taste and sight follow closely, and the development of touch aids in their perfection and makes them more acute. While taste and smell are inseparable in the act of tasting, the sense of smell is of later development than the sense of taste. Hearing is developed later than the other senses, but next to sight it is the sense which gives us the widest range of knowledge.

Since each sense produces its own peculiar sensations, it follows that all senses should be trained. The training of the eye and ear to the neglect of touch, taste and smell is a serious error and deprives children of the

chance to acquire at first hand much valuable knowledge. Because sight and hearing are so easily trained, parents and teachers are prone to neglect the development of the other senses. See PERCEPTION.

SENSES, SPECIAL. The sensory nerves convey to the brain two classes of impulses, those arising from conditions within the system, such as fatigue, exhilaration, hunger, thirst and the various feelings caused by disease, and those arising from contact with external objects, which give us a knowledge of the outside world. The former are classed as *general*, and the latter as *special* sensations.

The special senses comprise those organs, sensory nerves and brain centers which respond only to special stimuli. In the order of their complexity they are (1) touch and the temperature sense; (2) the muscular sense (3) taste; (4) smell; (5) hearing, and (6) sight. The organs of special sense bring to their respective brain centers impulses which these centers alone can translate, and this translation gives us the knowledge of sight, sound, touch, etc. It is supposed by some physiologists that the impulses are all alike and that the different interpretations are due solely to the brain centers; but there is no definite knowledge as to the method by which the impulses conveyed to the brain from the different organs are translated into mental impressions. That these impressions are wholly due to the brain centers is certain. A blow on the back of the head, or the stimulation of the optic nerve by electricity will cause a sensation of light in the darkest room.

There is no sharp line of separation between the general and special senses. By the increase of the stimulus, what is a special sensation, as touch, may be changed to pain. This is well illustrated by the increase of pressure at one point on the hand. A light pressure gives rise to the sense of touch, but when increased beyond this limit, it becomes painful, and we experience the pain only. The special sensations are also evolved from the general, as their development from the lower orders of animals illustrates. All impressions arising through the nerves of special sense have a physiological and a psychological phase. These phases are explained in the article SENSATION.

Related Articles. Consult the following titles for additional information:

Ear	Smell
Eye	Taste
Nervous System	Touch

SENSITIVE PLANT, *sen'si tiv*, a plant native to south America, so called because at the approach of night or when shaken or roughly handled its leaflets fold over each other in pairs and each of the leafstalks bends toward the stem as if shrinking from its intruder. At sunrise, or when undisturbed, the leaves gradually unfold and recover their normal state. Many species of different families show similar sensitiveness in lesser degree.

SEOUL, or **SEUL**, *sa ool'*, the capital of the Japanese province of Chosen, or Korea, situated on the north bank of the Seoul River, about three miles north of the Han River and about nineteen miles northeast of Chemulpo, its port on the Yellow Sea. The two cities are connected by rail, and there is also rail communication between Seoul and the cities of Fusan and Wiju. Seoul has been the capital of Chosen over 600 years. It has the narrow streets and mean houses so common in Oriental countries, but is slowly being modernized, and now possesses electric lighting, telegraph and telephone service and electric street transportation. There are few buildings of interest besides the Roman Catholic cathedral, the ancient royal palace and a temple to Confucius. Population, 1921, 250,308. See CHOSEN.

SEPARATOR, CREAM. See CREAM SEPARATOR.

SEPIA, the name of a cuttlefish, also of a pigment used by painters to produce a beautiful brown color prepared from the secretion of an organ in the cuttlefish, called the *ink bag*. The original black color is changed to brown by dissolving in caustic potash. This solution, after boiling and filtering, forms the sepia of commerce. The black coloring matter obtained from the ink bags is marketed, after undergoing several processes, as India ink. See CUTTLEFISH; INDIA INK.

SEPOY, a native British Indian soldier. The Sepoys who are of practically every race and tribe in India, have been a part of the British forces since the middle of the eighteenth century, and except at the time of the rebellion (1857) have always been loyal to England. There are now about 140,000 Sepoys in the British service, officered by both natives and Europeans. They are courageous, temperate and hard fighters and are an important part of the British army in India. See SEPOY REBELLION.

SEPOY REBELLION, *re bel'yun*, a mutiny of native troops in India which began in May, 1857. It was the result of resentment over the introduction of Western ideas, particularly the English disregard for native customs and religious beliefs. The Hindus will not taste anything derived from a pig or a cow, and consequently when the Sepoys, as the native troops are called, were ordered to use greased cartridges, they objected to biting the cartridge casings and rose in revolt. The rebellion started at Meerut, near Delhi, and spread to Delhi, Cawnpore and Lucknow, and many Europeans, including women and children were massacred. The revolt was crushed in June, 1858. The effect of the rebellion was far-reaching, one result being the transfer of the government of India from the East India Company to the crown.

SEPTEMBER, the ninth month, the month combining

"Summer's best of weather
And autumn's best of cheer."

The name is derived from the Latin word for *seven*, for in the old Roman calendar September was the seventh month. When Julius Caesar made his calendar revisions September became the ninth month, but retained its name. Then, as now, it had thirty days. About the twenty-second of the month the sun crosses the equator on its journey toward the Tropic of Cancer, and days and nights are equal all over the world. In September we look back to fading summer and forward to the falling of the leaves and other tokens of autumn. In northern climes there are occasional hot, dry September days much like those of August, but they pass quickly by, and are soon replaced by October's "golden weather." Among the wild flowers blooming in September are the fringed gentian and the wild aster. The goldenrod is September's flower emblem, and the sapphire its special gem.

Special Days for Observance. The first Monday of September is celebrated as Labor Day throughout the United States and Canada. This is the only general September holiday, but American negroes celebrate September 22, as Emancipation Day.

Anniversaries for Celebration. The following birthdays of notable people fall in September:

Peter Cartwright, September 1, 1785.
James Gordon Bennett, September 1, 1795.
Henry George, September 2, 1839.
Eugene Field, September 2, 1850.

Sarah Orne Jewett, September 3, 1849.
Pindar, September 4, 522 B. C.
Phoebe Cary, September 4, 1824.
Cardinal Richelieu, September 5, 1585.
Lafayette, September 6, 1757.
Sir Georges E. Cartier, September 6, 1814.
Jane Addams, September 6, 1861.
Queen Elizabeth, September 7, 1533.
Richard I, September 8, 1157.
Charles Dudley Warner, September 12, 1829.
John J. Pershing, September 13, 1860.
Charles W. Gordon, September 14, 1860.
Charles Dana Gibson, September 14, 1867.
James Fenimore Cooper, September 15, 1789.
Francis Parkman, September 16, 1823.
Samuel Johnson, September 18, 1709.
Alexander the Great, September 20, 356 B. C.
Louis Joliet, September 21, 1645.
Clark Howell, September 21, 1863.
Caesar Augustus, September 23, 63 B. C.
John Marshall, September 24, 1755.
Felicia D. Hemans, September 25, 1793.
Samuel Adams, September 26, 1722.
Robert Clive, September 29, 1725.
Admiral Nelson, September 29, 1758.
Pompey, September 30, 106 B. C.

The following notable events occurred in September:

Rule of India relinquished by the East India Company to the Crown, September 1, 1858.
Battle of Actium, September 2, 31 B. C.
Organization of United States Treasury Department, September 2, 1789.
New style calendar adopted in Great Britain and its colonies, September 3, 1752.
Treaty of Paris signed, September 3, 1783.
Third Republic declared in France, September 3, 1870.
First Continental Congress met in Carpenter's Hall, Philadelphia, September 5, 1774.
Mayflower sailed from Plymouth, September 6, 1620.
President McKinley shot, September 6, 1901.
Peary announced his discovery of the North Pole, September 6, 1909.
First Battle of the Marne begun, September 6, 1914.
Galveston tornado, September 8, 1900.
California admitted to the Union, September 9, 1850.
Battle of Lake Erie, September 10, 1813.
Battle of the Plains of Abraham, September 13, 1759.
American victory at Saint Mihiel, September 13-14, 1918.
Constitution of the United States signed by the Convention, September 17, 1787.
Quebec surrendered to the English, September 18, 1759.
President Garfield died, September 19, 1881.
Death of Nathan Hale, September 22, 1776.
Balboa discovered the Pacific, September 25, 1513.
Holy Alliance formed, September 26, 1815.

SEPTIMIUS SEVERUS, ARCH OF, a triumphal arch in Rome, located at the end of the Sacred Way, on the Forum. It was erected in A. D. 203 by the Senate and dedi-

cated to the Emperor Septimius Severus and his two sons, Caracalla and Geta, in commemoration of the victory over the Parthians and Arabians. The arch is seventy-five feet high and bears inscriptions and reliefs descriptive of the campaigns of Severus.

SEPTUAGINT, *sep'tu a jint*, the oldest Greek version of the Old Testament, believed to have been begun in the third century B. C., in Alexandria, Egypt, and completed before the Christian Era. Its name refers to an early belief that it was written in seventy-two days by seventy-two scholars brought by Ptolemy Philadelphus from Jerusalem. The oldest existing copies are still used by scholars for criticism and comparison of the text with other versions of the Old Testament.

SEQUOIA, *se kwoi'a*, large trees belonging to the cypress family, found on the Coast Range and the Sierra Nevada mountains in California and Oregon. There are but two species, one popularly known as the *big tree*, the other as the *redwood*.

The Big Trees. This name is given to a number of trees found only on the western slope of the Sierra Nevadas in California. These trees grow in groups, popularly called groves, and stand amidst smaller trees of different kinds. The Mariposa grove, sixteen miles south of Yosemite Valley, is now a part of Yosemite National Park. Another national park, the Sequoia, contains over 1,000,000 of the big trees; an area of 2,560 acres about General Grant Tree is also a national park (see PARKS, NATIONAL).

The average height of the big trees is 275 feet; a number, however, attain 300 to 325 feet. The average diameter is twenty feet, though the largest trees measure twenty-five and thirty feet. The trunk is straight and slightly tapering, bearing on the upper half or third a crown of branches. Branches are seldom found below 125 or 150 feet. The bark of the old trees is cinnamon-red, and is reddish-purple on the young. It has an average thickness of eleven or twelve inches, but on some of the largest trees it is two feet in thickness and is deeply grooved and very rough. As the bark does not burn readily, it serves to protect the trees from forest fires. The branches are short and thick, and divide into tufts of fine spray which bear short, flat leaves, closely crowded together. The fruit is a cone about two inches long and one and one-half inches in diameter, each of which

produces many tiny seeds. The wood is soft and of a slightly reddish hue.

Examples of Size. In 1854 one of the big trees was cut down. The task was accomplished by boring off the trunk with augers, and it took five men twenty-two and one-half days to accomplish the work. A pavilion was built on the stump, which is now used as a dance hall, affording ample room for twenty couples on the floor and for the musicians and a fair number of spectators.

Another fallen tree in this grove was over 400 feet in height and measured 30 feet in diameter at its base. The heart has been burned out, and a man can ride through the hole in the trunk on horseback for a distance of ninety feet and emerge through an opening caused by the breaking off of a limb.

In the Mariposa grove a roadway has been cut through one of the standing trees, the tunnel being wide enough to afford ample room for the largest coach; yet this does not seem to have affected the strength or life of the tree.

Age and Tradition. The age of the big trees is not definitely known. They are probably the oldest living objects upon the earth, the largest being estimated to be from 2,500 to 3,000 years old—over six hundred years of age at the birth of Christ. According to Indian belief, the big trees alone were especially created by the Great Spirit; all other trees of the forest grew just like other plants. The genus was named in honor of Sequoyah, a half-caste Cherokee Indian who invented an alphabet for his tribe.

Redwood. Like the giant sequoias, the redwoods attain heights of 250 to 300 feet, with diameters often of fifteen feet. These trees are found on the Pacific side of the Coast Range in California and Southern Oregon, and are the most valuable timber trees west of the Rockies. The redwoods are being felled faster than the big trees, as they are more accessible. Redwoods send up suckers from the stumps and seed themselves, which obviates the danger of forest depletion; this is not characteristic of the big trees.

SERAGLIO, *se ral'yo* (properly, SERAI), the palace and its surrounding buildings formerly serving as the royal palace of the Turkish sultan at Constantinople. As it has not been used by the sultan since 1839, it is falling into ruin. Situated on a point of land projecting into the sea, its walls embrace a circuit of about nine miles, including several

mosques, the museum of Constantinople, the harem, and buildings capable of accommodating 20,000 men. Among the Turks the name is often used to designate any residence of the sultan.

SERAJEVO. See SARAJEVO.

SERAPIS, *ser'a'pis*, an Egyptian deity, compounded of the names Osiris and Apis, introduced into Egypt in the reign of Ptolemy I. A magnificent statue of Serapis, doubtless originally a statue of Jupiter, was built at Alexandria in a temple called the Serapeum, the last hold of the pagans in that city after the introduction of Christianity. The Egyptians never acknowledged Serapis in their pantheon; he was the principal deity in the Greek and Roman towns of Egypt. Forty-two temples are said to have been erected to him in Egypt under the Ptolemies and Romans. His worship extended also to Asia Minor and was introduced into Rome by Antoninus Pius. The image of Serapis perished with his temple at Alexandria, destroyed in 389 by the order of Theodosius.

SER'APIS, THE. See BON HOMME RICHARD.



SERBIA, *sur'bi'a*, one of the states of the Balkan Peninsula, proclaimed an independent kingdom in 1882. In 1914 this small slavic nation was attacked by Austria-Hungary, and in the great international conflict which followed it suffered more than any of the other belligerents except Belgium. Overrun by Austrians, Germans and Bulgarians, its people subjected to all the horrors of famine, deportation and the other calamities of invasion, Serbia was a physical and economic ruin by the end of the World War, in 1919. After the revolution in Austria-Hungary, the provinces known as Slovenia, Bosnia, Croatia, Dalmatia declared their independence. Serbia joined the movement, which resulted in the formation of the Serb, Croat, and Slovene State (Jugo-Slavia). A constitution was adopted in June, 1921, with Alexander I, of the Serbian royal line, as King. The new state has received recognition from other nations, and shows evidence of permanent stability.

Area and Population. At the outbreak of the World War, in 1914, Serbia had an area of 33,891 square miles, about 850 square miles greater than the area of Maine. According to the boundaries then existing, it lay between Austria-Hungary on the north and Greece on the south, with the Danube and the Save rivers separating it from the dual monarchy. Bulgaria and Rumania adjoined the country on the east, and on the west lay Bosnia, Montenegro and Albania.

Its population in 1914 was nearly 5,000,000 but this number was reduced to 3,500,000 by 1919, according to careful estimates. Of the number who remain, about three-fourths are devitalized from hunger, disease and the strain of war. Large numbers of Serbs are found in the regions adjoining old Serbia, and their union with their kinsmen and the Croats and Slovenes will, it is expected, bring about a building up of the oppressed people of the invaded kingdom. The Serbs are intense lovers of freedom, and have long resented the use of the forms *Servs* and *Servia* for Serbs and Serbia. The former terms are not only incorrect, but are distasteful because they are derivatives of the Latin *servus*, or *slave*.

Physical Features. The surface is high and mountainous, the country being traversed by spurs of the Carpathian Mountains in the northeast, the Balkan in the southeast and the Dinaric Alps in the west. None of these is high, and the loftiest summit, Liubotrn, has an altitude of 8,600 feet. The whole country is drained into the Danube, either directly through the Morava, which flows through the center, or indirectly by the rivers that form a part of the boundary. Along the western border are the Drina and the Drin. The climate in the elevated regions is rigorous, but in the valleys and lowlands it is mild and equable. There is plenty of rainfall, and the mountains are covered with forests.

Resources and Industry. Serbia is pre-eminently an agricultural country, and is a land of small farms owned and cultivated by peasants. There are few farms over thirty acres in extent. Wheat, barley, oats, corn, rye and sugar beets are profitable crops, and various fruits, notably plums, are grown. Large quantities of these are dried and exported as prunes, made into marmalade or used in making wine. Silkworms are raised in large numbers, and in the hilly regions ex-

tensive pastures make the raising of live stock an important industry. There are extensive forests of beech, oak and fir, about 1,375,000 acres being under state control.

Flour milling is one of the most important manufacturing industries; before the war there were seventeen large mills in the country. Brewing and distilling, sugar refining, the manufacture of celluloid, carpet weaving, tanning, bootmaking, iron working and the making of pottery are other industries carried on in normal times. The weaving of carpets, a very old industry, is centered in the southeast, in Pirot. The carpets are made of pure wool, colored by local dyers with natural dyes and by a secret process.

Serbia has valuable deposits of coal and lignite and mines of lead, zinc, copper and iron. The mining industry has never been developed to full capacity because of lack of capital and transportation facilities. There was considerable exploitation of the coal deposits by the Germans during the period of occupation.

Transportation and Communication. There are about 975 miles of railroad. A railway between Belgrade and Nish connects with the trunk line which joins Berlin and Vienna with Sofia (Bulgaria) and Constantinople, a factor in Germany's plan for a "Mittel Europa." A railway to Saloniki, Greece, gives Serbia an outlet to the Aegean Sea. The Danube, Drina and Save rivers are navigable.

Government, Religion, Education. Under the constitution of 1903 the executive power is vested in the king, who is assisted by a council of eight Ministers. The people are represented in a legislative assembly called the *Skupshchina*, the members of which are chosen at a general election. There is also a council of state, one-half of whose members are appointed by the *Skupshchina* and the others by the king. The capital is Belgrade, in the northern part of the kingdom, and the Greek Church is the State Church. Elementary education is compulsory, and in all the primary schools under the Ministry of Education it is free, but the rate of illiteracy is high. At Belgrade there is a university founded in 1838, which had over 900 students before the war.

History. In ancient times Serbia formed a part of the Roman province of Moesia. After this it was occupied in succession by Huns, Ostrogoths, Lombards and other tribes. In the seventh century the country was entered

by the Serbians, but in the century following it acknowledged the supremacy of the Byzantine emperors. Later Serbia became independent, and in the middle of the fourteenth century it included all of Macedonia, Albania and Thessaly, the northern part of Greece and Bulgaria. After this its power declined and it became tributary to Turkey, remaining in this condition for about 200 years. In 1718 the greater part of the territory was ceded to Austria, but a few years later was again transferred to Turkey. The oppression of the Turkish government led to several wars, and from 1812 to 1878 the country was ruled by a number of monarchs who were vassals of the sultan. In 1877, during the Russo-Turkish war, Serbia rebelled, and by the Treaty of Berlin in the following year its independence was recognized by the European powers. In 1912 and 1913 Serbia was at war with Turkey and later with Bulgaria, and by the Treaty of Bucharest (1913) it received over 15,000 square miles of territory, comprising four departments. Over 1,700,000 people were added to its population.

In June, 1914, the assassination of the heir to the Austro-Hungarian throne, at Sarajevo, Bosnia, was made the pretext of a declaration of war against Serbia by Austria-Hungary. The latter country claimed that Serbia was the hot bed of Slavic agitation against the integrity of the dual monarchy. Out of this complication was evolved the greater conflict, in which Serbia became a martyred nation. Belgrade was occupied by Austro-German troops on October 9, 1915, and by the close of the year the whole country was under the heel of the oppressor. The sufferings of the people through disease, exhaustion, exile, and persecution from Austrians, Germans and Bulgarians awakened outside sympathy akin to that inspired by the sufferings of the Belgians and Armenians. The aged King Peter and his court removed to Greece for the duration of the war. Late in 1918, Belgrade, then a city stripped of all its valuables, was liberated, but the king remained in retirement, leaving the duties of administration to his son, Prince Alexander, and the Cabinet. Alexander was proclaimed regent of the Jugo-Slavic state in November, 1918.

Related Articles. Consult the following titles for additional information:
 Balkan Wars Jugo-Slavia
 Belgrade Monastir
 Berlin, Congress of Nish
 Carpathian Mountains Peter I
 Danube World War

SERFS, a term applied to a class of laborers existing under the feudal system, whose condition, though not exactly that of slavery, was little removed from it. Under feudalism, from the vassals of the king downward, the whole community was subject to certain degrees of servitude, and it was only on condition of specific services to be rendered to his superior that any individual held his land. In the case of the lower classes this servitude amounted almost to complete surrender of personal liberty. There were two classes of laborers, the villeins and the serfs proper, the former occupying a middle position between the serfs and the freemen. A serf could not be sold, but could be transferred along with the property to which he was attached. A serf could obtain his freedom by purchase, by residing for a year and a day in a borough or by military service. By these various means the serf population gradually decreased, and in most parts of the Continent had disappeared by the fifteenth century. Serfdom in England and Scotland was extinguished very gradually, existing almost in its original form as late as 1574; and even in the eighteenth century a species of serfdom existed among Scottish miners. Serfdom in Russia did not originate in feudalism, but in royal enactment; it was abolished by a manifesto of Alexander II, on March 17, 1861.

SERGEANT, *sahr'jent*, in a military company or in a marine corps, the highest non-commissioned officer, ranking above a corporal. He is below a second-lieutenant, who is the lowest commissioned officer. The top sergeant, or sergeant-major, ranks in authority over all other sergeants in a company.

SERGEANT-AT-ARMS, an officer of a legislative body or of any deliberative assembly. His duty is to execute the orders of its officers and to preserve order. In legislative bodies the mace (which see) is the emblem of his authority.

SERINAGUR, *se ré na gur*, or **SRINAGAR**, INDIA, capital of Kashmir, situated in the Kashmir valley, on both banks of the Jhelam River, 170 miles northeast of Lahore. It is an exceedingly picturesque town when seen from a distance, but the streets are narrow and dirty and contain but little of interest. In the environs are beautiful gardens, and also the lake made famous by Moore in his *Lalla Rookh*. The chief industries are the manufacture of shawls and

rugs, the production of attar of roses and the making of silver articles. Population, 1921, 141,631.

SEROUS MEMBRANES, certain double membranes in the human body, as the pleura, the pericardium and the peritoneum, which form a sort of closed sac surrounding certain organs, the interior surfaces of the sac secreting a small quantity of serous fluid. Serous membranes line cavities not exposed to the air. Their chief function is to allow free action to the organs and prevent the injurious effects of friction. The synovial membranes of the joints belong to this class. These membranes are subject to various diseases. See **PLEURISY**.

SERPENT. See **SNAKE**.

SERPENT CHARMING, a so-called art of great antiquity, confined in practice to Egypt and the East. Although it is a common practice of the charmer to extract the fangs before exhibiting the snakes, this is not always done. The instrument usually employed in serpent charming is a kind of pipe, which is varied by whistling and the use of the voice. The effect of this medley of sounds is to entice the serpents from their holes so they may be pinned to the ground with a forked stick. In India and other Eastern countries the art of serpent charming is an hereditary profession. In addition to the evident power music has upon the serpents, they appear to be influenced in a marked degree by the eye of the charmer, who controls them merely by fixing his gaze upon them.

SERPENTINE, *sur'pent in*, a rock composed of magnesia, silica and water, ranging in color through varying shades of green to red, yellow or brown. It takes its name from its mottled-green appearance, which was formerly supposed to resemble the skin of some serpents. Much of serpentine is veined or spotted with streaks of white; these varieties are known in the United States as *verde antique* marble. Serpentine takes a high polish and is quite extensively used in finishing for the interiors of public buildings. It is not a good stone for exteriors, because it contains more or less iron, which, on weathering, discolours the stone. It is found in Switzerland, Italy and a number of localities in the United States.

SERUM THER'APY, the treatment of disease by means of blood serum, containing germs which by creating antitoxins in the

blood of the patient render him immune or enable him to resist a disease already acquired. Cultures of the specific germ are made, and some animal, usually a healthy horse, is inoculated. The serum from this animal is tested on a rabbit, for instance, and if found to protect the little animal from inoculation with active disease germs, the serum is felt to be safe for human beings. Vaccination for smallpox is an example of vaccine therapy. Serum therapy has been used with varying success in pneumonia, cholera, typhoid, diphtheria and several other bacterial diseases and promises great results in the fight against disease. See GERM THEORY OF DISEASE.

SERVAL, *sur'val*, a large South American wild cat, about three feet in length. Its general body-color is a bright golden, tinged with



SERVAL

gray and marked with black spots. Its tail is sixteen inches long. The serval, or *tiger cat*, as it is sometimes called, is easily tamed, if captured when young. Its fur commands high prices.

SERVETUS, *ser'vetus*, MICHAEL, or MIGUEL SERVETE (about 1511-1553), a Spanish physician, scholar and theologian, who was burned at the stake as a heretic. He was born at Tudela, in Navarre. At the age of seventeen he was sent to Toulouse to study civil law, but soon devoted his interests to theology. He incurred the enmity of Roman Catholics and Protestants during the Reformation. After the publication of his *Christianismi Restitutio* (Restoration of Christianity) in Vienna, he was arrested for heresy and imprisoned, but escaped to Naples. He was arrested at Geneva, however, on a charge of blasphemy and heresy, and his various writings were sifted in order to insure his condemnation. The divines of all the Protestant Swiss cantons unanimously declared for his punishment, and Calvin was

especially urgent and emphatic as to the necessity of putting him to death. Servetus is numbered among the anatomists who made the nearest approach to the doctrine of the circulation of the blood before the time of Harvey.

SERVIA. See SERBIA.

SERV'ICE, ROBERT WILLIAM (1876-), a Canadian poet and novelist, whose vigorous ballads of the Northwest have gained for him a secure place in Canadian literature. He was born at Preston, England, and educated at Glasgow, Scotland. In 1897 he emigrated to Canada and traveled extensively through the West, encountering experiences which later supplied rich literary material. In 1905 he joined the staff of the Canadian Bank of Commerce and later worked in the bank's branches at White Horse, Yukon Territory, and at Dawson City. His close contact with the vigorous elemental life and wild scenes in the sub-arctic regions enabled him to write about them with accuracy and feeling. The men and conditions he pictures and his literary workmanship give him a place in Canadian literature somewhat like that of Bret Harte's in American literature. His books of verse include *The Spell of the Yukon*, *Songs of a Sourdough*, *Ballads of a Cheechako*, *Rhymes of a Rolling Stone* and *Rhymes of a Red Cross Man*. He has written two novels, *The Trail of '98* and *The Pretender*. He served for two years as ambulance driver in France in the World War.

SERVIVS TULLIVS, *ser'vi us tul'i us*, the sixth of the seven legendary kings of early Rome. According to tradition he was the son of a slave who was given by the elder Tarquin to his wife. He married Tarquin's daughter, and on the death of his father-in-law (578 B. C.) ascended the throne. He established many civil rights and institutions, greatly improved the condition of the common people, thereby antagonizing the patricians, and extended and beautified Rome.

SESAME, *ses'a me*, GRASS. See GAMA GRASS.

SETI I, *sa'te*, an Egyptian king, the second Pharaoh of the nineteenth dynasty (1462 to 1288 B. C.) and father of Rameses II (see RAMESSES II). On the walls of the Hall of Columns at Karnak, which he built, are described his campaigns whereby he established the power of Egypt over a large portion of Western Asia. He built the Temple of Osiris at Abydos.

SETON, ERNEST THOMPSON (1860-), a popular author, artist and lecturer, born in Shields, England. Much of his early life was spent in the Canadian backwoods and on the Western plains. He was educated at the Toronto Collegiate Institute and at the Royal Academy in London, England, and studied six years in Paris. In 1901 he organized the Woodcraft Indians, for boys, a society which later became a nucleus for the Boy Scouts (which see). In 1891 Seton became official naturalist to the government of Manitoba. He was one of the chief illustrators of the Century Dictionary and has illustrated many books on birds and animals.

He is best known as the author and illustrator of stories about animals. These include *Wild Animals I Have Known*; *The Biography of a Grizzly*; *Lobo*, *Rag and Vixen*; *Lives of the Hunted*; *Two Little Savages*; *Monarch, the Big Bear*, and *Animal Heroes*, all dealing with animal life in a way which was original with the author. The truth of Seton's accounts of animals has been questioned by many naturalists, but the stories have certainly aroused a new interest in animals and led to increased study of their habits. Seton has contributed numerous articles and illustrations to magazines and scientific publications and delivered many lectures. He claims to have organized the Boy Scouts, but this distinction is disputed by Daniel Carter Beard.

SETTER, a handsome hunting dog weighing from fifty to sixty pounds and having soft, silky hair, sometimes wavy, and droop-



SETTER

ing ears. Three breeds are recognized. These are the English, which is white, with black markings; the Gordon, rich glossy black, with reddish-brown markings; the Irish, a uniform chestnut color. The dogs are taught to raise a forefoot to indicate game. They are intelligent and easily managed.

SEVEN PINES. See FAIR OAKS, BATTLE OF.

SEVEN SLEEPERS, according to a sixth-century story, were seven Christian youths of Ephesus, who, by a command of the Emperor Decius, were imprisoned in a cave in Mount Celion, in which they had taken refuge. Here they fell into a deep slumber, from which they were awakened by a shepherd after a lapse of about two hundred years. On emerging from the cave, during the reign of Theodosius II, they were surprised at changed conditions everywhere, as was the populace over their strange visitors. The youths related their story to the multitude, gave it their blessing, and died. The Mohammedans have a similar legend.

SEVENTEEN-YEAR LOCUST. See CICADA.

SEVENTH DAY ADVENTISTS, the largest sect of the Adventists, numbering about 83,000 members in America and supporting more than 2,000 churches. According to their doctrine, the seventh day of the week, the Christian Saturday, is the Sabbath. They believe that the dead sleep till the day of judgment; that the unsaved are destroyed; that the care of bodily health, total abstinence and the eating of vegetable food are religious duties. They have established sanitariums in various states, and their missionary work extends into almost every country in the world. In the United States their headquarters are at Takoma Park, a suburb of Washington, D. C.; previous to 1903 the headquarters were at Battle Creek, Mich. Their publications are numerous and embrace discussions of the Bible and of their own peculiar doctrines, histories of their sect, and treatises on health and disease.

SEVEN WEEKS' WAR, a struggle, in 1866, between Prussia and Italy on one side and Austria and its allies on the other, which determined that Prussian influence was to be predominant in Germany. The issue was forced by Bismarck, who used the Schleswig-Holstein controversy as a pretext. The Prussians under Von Moltke were from the first victorious, and after the Battle of Königgrätz, or Sadowa, Austria was obliged to sue for peace, which was concluded in the Treaty of Prague.

Related Articles. Consult the following titles for additional information:

Austria-Hungary
Bismarck-Schön-
hausen

Moltke, Count von
Sadowa, Battle of
Schleswig-Holstein

SEVEN WISE MEN OF GREECE, men who are largely shrouded in obscurity who lived in the sixth and seventh centuries before Christ. The generally-accepted list of these sages and philosophers includes Periander, Pittacus, Thales, Solon, Bias, Chilon and Cleobulus. Maxims of prudence and elementary morality are regarded as embodying a summary of their wisdom. Among these maxims are "Know thyself," "Nothing in excess," "Consider the end," "Forethought in all things."

SEVEN WONDERS OF THE ANCIENT WORLD, a group of seven most notable works of art of antiquity, celebrated for their beauty and colossal size. The earliest list of these was compiled from numerous guide books of the Greeks, and varies but little from the later and more authentic list found in the work of Philo of Byzantium. This latter includes the Pyramids of Egypt; the Hanging Gardens of Semiramis, at Babylon; the statue of Zeus, or Jupiter, by Phidias, at Olympia; the Temple of Artemis, or Diana, at Ephesus; the Mausoleum at Halicarnassus; the Colossus of Rhodes; and the Pharos, or Lighthouse, at Alexandria.

Seven Modern Wonders. Science takes precedence over art in the list of seven wonders of the modern world, which is devoted to its great inventions and discoveries. Leading scientists include the following seven as the most marvelous scientific discoveries of modern times: the wireless telegraph, invented by Marconi; the telephone, invented by Reis of Germany and Gray and Bell of the United States; the aeroplane, invented by the Wright brothers, of Ohio; the discovery of antiseptics, by Sir Joseph Lister; radium, discovered by Pierre and Marie Curie; the X-ray discovered by Roentgen; and spectrum analysis, discovered by Sir Isaac Newton.

Related Articles. The following articles give specific information about the ancient and modern wonders:

Antiseptic	Pyramids
Colossus	Radium
Flying Machine	Roentgen Rays
Hanging Gardens	Spectrum Analysis
of Babylon	Telegraph, Wireless
Mausoleum	Telephone
Pharos	

SEVEN YEARS' WAR, a famous war between Prussia and other European powers, which lasted from 1756 to 1763. As the result of a war with Prussia, Maria Theresa of Austria had been forced to cede Silesia to Frederick the Great. To recover her lost

territory she concluded an alliance with Russia, secured the support of Poland and Saxony and attempted to form a closer union with France. In the meantime war broke out between France and England (1755), and George II, in order to protect his German states, concluded an alliance with Prussia, a move which decided France to aid Austria. Being informed of these negotiations, Frederick resolved to anticipate his enemies. In August, 1756, he invaded Saxony, occupied the chief towns and compelled the Saxon army to surrender. This step created a stir in the European courts, and in 1757 Austria, Russia, France, Sweden and the German Empire were in arms against Frederick, while he had no allies but England and a few German states. In 1757 Frederick marched into Bohemia and gained a bloody battle at Prague. Soon after this, however, the Austrians, under Daun, defeated Frederick at Kolin, relieved Prague and forced the Prussians to retreat to Saxony. The French army, after defeating Frederick's allies under the Duke of Cumberland, united with the imperial forces. Frederick met them at Rossbach and routed both armies, then hurried back to Silesia, which was occupied by the Austrians, and vanquished a superior army under Daun at Leuthen, thus recovering Silesia. While Frederick was thus occupied in the south and west, his general, Lehwald, had successfully repelled the Swedes and Russians on the north and east.

The next campaign was opened in February, 1758, by Ferdinand, Duke of Brunswick, who, at the head of Frederick's allies, opposed the French in Lower Saxony and Westphalia. He defeated the French at Crefeld in June and ultimately drove the enemy beyond the Rhine. Frederick defeated the Russians at Zorndorf and was defeated in turn by Daun at Hochkirch, but before the end of the year he drove the Austrians from Silesia and Saxony.

In 1759 Frederick suffered at Kunersdorf a defeat such as he had never sustained before, and his position became extremely precarious. The British victories over the French helped matters somewhat, and the campaign of 1760 opened well for him. George II of England died in this year, however; Pitt was removed from power and Prussia thus lost its only ally. It seemed as if nothing could save it, but in 1762, when Frederick's fortunes were at their worst,

Elizabeth of Russia died and was succeeded by Peter III, who was an enthusiastic admirer of Frederick. Russia made a treaty with Prussia, but Peter was deposed before Russia could lend Frederick any substantial aid. However, Russia did not again join Austria, and as both sides were practically exhausted, peace was concluded at Hubertsburg in 1763. Matters were adjusted as they had been before the war, and Frederick was allowed to retain Silesia. The struggle between France and England in Europe was accompanied in America by the conflict known as the last French and Indian War (See FRENCH AND INDIAN WARS).

SEVERN, *sev'ern*, the second largest river in England. It rises in Wales, and after a circuitous easterly and southerly course of about 210 miles, through England, it empties into the British Channel through an estuary under which runs a tunnel about four miles long. It is navigable a distance of 180 miles. Below Gloucester the banks are so low that destructive inundations have frequently occurred. Worcester and Shrewsbury are two other important cities on the Severn.

SEVERUS, *se'verus*, LUCIUS SEPTIMIUS (146-211), a Roman emperor. After the murder of Pertinax in 193 he was proclaimed emperor by his troops, and is therefore included among the "Barracks Emperors." Severus marched to Rome to subdue the partisans of Julianus, who had obtained the throne from the praetorians by bribery. On his approach, Julianus was assassinated by his own soldiers. Severus banished the praetorians and ridded himself of the rivalry of Albinus, commander of the Roman forces in Britain. He then marched to the East against Pescennius Niger, who had also been elected emperor by a powerful army. After many obstinate battles, Niger was routed on the plains of Issus. Having sacked Byzantium and conquered several Eastern peoples, Severus returned to Rome. After a successful campaign against the Parthians, he next subdued an insurrection in Britain. To protect the people of the south from incursions of the Highlanders, he built a stone wall from the Tyne to the Solway Firth. See ROMAN WALLS.

SEVILLE, *se vil'*, SPAIN, is situated on the Guadalquivir River, sixty-two miles north northeast of Cadiz. It is built in Moorish style, has narrow streets, lined with old Moorish houses, which are usually built around

interior courtyards with fountains in the center. Many of the dwellings are of two stories, and nearly all of them are white. The city is notable for its abundant and beautiful vegetation. It was formerly enclosed by a wall, but only a few remains of this are now visible. The principal parks or squares are the Plaza de San Fernando and the Plaza de Triunfo, upon which is the cathedral. The city also has a number of boulevards, noted for their beauty. Among the buildings of note are the Cathedral of Seville, which ranks next to Saint Peter's at Rome in size; the Giralda, the Campanile, in the form of a square tower over 300 feet in height and dating from the sixteenth century; the palace of the Moorish kings, or the Alcazar, and the chapel of the Catholic kings.

The chief educational institutions include the University of Seville, the provincial school of art, the provincial museum and the provincial library, which has over 80,000 volumes, and the Columbian Library, founded by the son of Columbus. The civil hospital is noted as one of the largest institutions of the kind in the world. The leading industries include the manufacture of tobacco, silk, ironware, soap and chocolate. The city has an important trade with the surrounding country. It is one of the oldest cities of Spain and was a place of considerable importance under the Romans. Next to Madrid it is the most important center of literature, art and education in Spain. During the eleventh century it was the capital of a Moorish state. Later it was captured by Saint Ferdinand of Castile, and was for a long time the capital of the Castilian dominion. At the time of the discovery of America, it was the leading commercial port of Spain. Population, 1921, 205,527.

SEVRES, *sa'vr'*, **PORCELAIN**, an artistic pottery having the general effect of a cameo, though possessing greater delicacy and richness of color. In its construction the *pate-sur-pate* (or layers) method is used, original with this ware. Sèvres porcelain has been highly prized since the first days of its manufacture at Vincennes, in 1745. In 1756 the manufactory was purchased by Louis XV, removed to Sèvres, and placed under state supervision; from the fact of its location here the name was derived. Many noted artists were employed to decorate the plaques, vases and ornaments which are still the pride of collectors. In recent years, how-

ever, very clever imitations have been made in Germany and England, and these have flooded the markets.

SEWAGE AND SEWERAGE. Sewerage is the system of pipes and conduits for conveying away from houses and factories the waste matter known as *sewage*, and depositing it at safe distances from cities and towns. Sewage is made up of solid and liquid matter from houses, the fluid waste from domestic and manufacturing operations, generally much of the surface drainage and sufficient water to carry away the waste. In small villages and in farming communities, each house disposes of its own sewage, usually in the soil, and this under ordinary circumstances is a safe method; but wherever people are crowded together it is necessary to dispose of all refuse matter promptly and completely (see **GARBAGE**). The customary way, especially in the smaller cities, is to float the sewage off in airtight tubes, to such a distance that it will be harmless. Except in very level countries, the force of gravity is sufficient to carry away the sewage, but in some places pumping stations are necessary to distribute it properly. It is evident that plenty of water is necessary to carry away the refuse successfully, and in many places drains are so arranged that surface water is conducted to the sewers, where it assists in carrying off the solid matter. Such a plan, however, is open to objections, since at times the sewer pipes are partially empty and poisonous gases collect and escape through the drainage openings. A better plan is to keep the drainage system separate from the sewers.

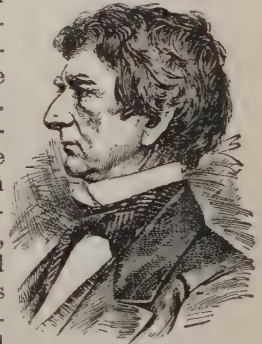
Small sewers are usually made of terra cotta or vitrified clay, but when they are more than two feet in diameter, iron pipes are used or brick sewers are constructed. In large cities the more expensive stone masonry and concrete are substituted for brick. The sewers should be properly ventilated, so that noxious gases may not rise through the pipes to the houses and cause sickness. To prevent the escape of sewer gas into dwellings and factories all drain pipes have a u-shaped bend called a *trap*, in which water constantly stands. Yet the danger from gas is not so great as the danger from polluting the soil or water supply of the town with the sewage. If the waste matter can be carried far out into some large body of water, it may be deposited with safety, because the water in

time disinfects the refuse; but where the sewage is thrown into small streams or small bodies of water, the possibilities for conveying disease to other places, if not to the one whence the sewage originated, can scarcely be overestimated.

The sewerage systems of great cities such as London, Paris, New York and Chicago involve some of the most difficult engineering problems found in any class of construction. Some of the mains in these systems are from sixteen to twenty feet in diameter. In order to dispose of the sewage Chicago excavated a drainage canal at an expense of \$50,000,000.

Sewerage on Farms. On many farms waste can be disposed of in the soil without danger, but on others there is great danger of water pollution. Most farm houses can be supplied with running water at a moderate expense; wherever this convenience is at hand, sewage can be conveyed to a safe distance, where it may be absorbed by the soil; but when this is not practicable, a settling tank in which the sewage is cleansed of impurities may be installed.

SEWARD, su'ard, WILLIAM HENRY (1801-1872), an American statesman, Secretary of State in Lincoln's Cabinet and purchaser of Alaska for the United States. He was born in Florida, Orange County, N. Y., and was educated at Union College. After practicing law for a number of years, he drifted into politics. In 1830 he was elected a member of the New York senate, in 1838 became governor of his state, and in 1849 entered the United States Senate. There he became the friend and adviser of President Taylor and distinguished himself by his firm resistance to the extension of slavery, opposing in eloquent speeches the Compromise of 1850 and the Kansas-Nebraska Bill.



WILLIAM HENRY
SEWARD

In 1860 he was a candidate for the Presidential nomination, but having been defeated in the convention by Abraham Lincoln, he exerted himself to secure Lincoln's election and was later appointed Secretary of State. In this post he discharged his duties with

great ability. He adjusted the Trent affair (see TRENT AFFAIR) and the Alabama Claims (see ALABAMA, THE), secured the withdrawal of the French from Mexico, and purchased Alaska from Russia. He was dangerously wounded in April, 1865, when Lincoln was assassinated, by an accomplice of Booth. He served as Secretary of State under President Johnson, and continued in public life until the inauguration of President Grant.

SEWING MACHINE, a device which has done away with much household drudging throughout the civilized world, and made the modern clothing industry possible, was patented by Elias Howe of Boston, in 1846.

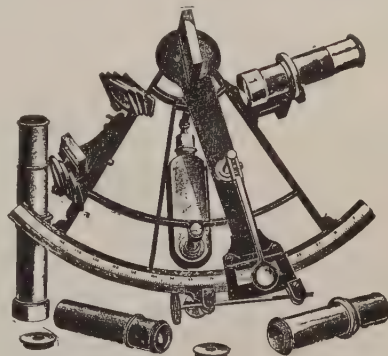
Howe's machine consisted of a needle, with an eye near the point, and below the cloth, a shuttle, which carried another thread on a small spool, called the *bobbin*. The needle was attached to an arm vibrating on a pivot so as to force the needle through the cloth. The shuttle carried the lower thread through the loop made by the upper thread and locked it as the needle tightened the loop with its upward movement. While numerous patterns of machines have been invented since, all double-threaded machines are constructed on the principle invented by Howe. The Singer machine, which soon followed the Howe, had an improved plan for operating the needle and for moving the cloth along as it was sewed. This machine also used the treadle as motive power. Previous to the invention of the Singer, all sewing machines were operated by turning a crank by hand.

Single-threaded machines make what is called a chain stitch. Of these the Wilcox and Gibbs is the most successful pattern. While these machines are easily operated, they have the defect that if one stitch becomes broken the entire seam is likely to be raveled. There are now sewing machines constructed for nearly every line of work done by the needle, such as sewing on buttons, making button-holes and sewing boots and shoes, harness and carpets.

We consider Howe the inventor of the sewing machine, because he was the first to get a practical machine on the market, but others had made the attempt at an earlier date. The first known attempt was that of Thomas Saint, an Englishman, in 1790, but his machine was not practical. In 1830 a machine was made in France which was successfully used in making clothes for the army, but it was destroyed by a mob, because the tailors

thought that its use would take away their employment. Two years later Walter Hunt of New York made a number of machines on a plan similar to that found in the successful machines of the present day, but he failed to take out a patent.

SEX'TANT, an instrument used for measuring angles between any two points, such as the sun and the horizon, employed most commonly by sailors in determining the posi-



SEXTANT

tion of a ship at sea or in marine surveying. It consists of a frame of metal and ebony, stiffened by cross-braces and having an arc embracing 60° of a circle. It has two mirrors, one of which is fixed to a movable index, and various other appendages.

The principle of the sextant, and of reflecting instruments in general, depends upon an elementary theorem in optics; namely, if an object be seen by repeated reflection from two mirrors which are perpendicular to the same plane, the angular distance of the object from its image is double the inclination of the mirrors.

In reading the graduated arc, half-degrees are taken as degrees, because that which is measured on the index is the angle between the mirrors, and this is half the distance between the objects. If one is familiar with the position of the star in the celestial sphere, the latitude of the ship can be found by comparing its altitude, as shown in the sextant, with this position.

SHACKLETON, *shak' 'l ton*, ERNEST HENRY, Sir (1874-1922), an English explorer of the Antarctic regions, born at Kilkee, Ireland, and educated at Dulwich College, London. He served as lieutenant in the British navy and was second in command to Captain Scott in the British Antarctic expedition of

1901. In 1906 he was defeated in an attempt to enter Parliament as a representative of Dundee. The following years he spent in command of an expedition in the Antarctic regions. In 1909 he reached latitude $80^{\circ} 23'$, a point 111 miles from the pole. Lack of supplies compelled him to turn back. This expedition, however, was of considerable importance, as it resulted in a gain of accurate knowledge of the south polar region. On his return to England Shackleton was knighted. His published account of his expedition is entitled *The Heart of the Antarctic*.

In 1914 Shackleton sailed on another expedition which was destined to be the most thrilling in the annals of polar exploration. His ship, the *Endurance*, was crushed in an ice pack; the party was forced to abandon it, and after unspeakable hardships on floating islands of ice and on the seas in open boats, the men finally were rescued and reached England in 1917. Shackleton has lectured in Great Britain, Canada and the United States, and has received many medals and other honors. See SOUTH POLAR EXPLORATION.

SHAD, a food fish of the family of herrings, including two species—the *common*, or *allice*, shad, and the *white* shad. The common shad inhabits the sea near mouths of



SHAD

large rivers, and in the spring ascends them for the purpose of depositing its spawn. The form of the shad is the same as that of other herrings, but it is of larger size, and in some places receives the name of *herring king*. Its color is a dark blue above, with brown and greenish lusters, the under parts being white. An American species, varying in weight from four to twelve pounds, is highly esteemed for food and is consumed in great quantities in the fresh state. Shad are found along the coast from New England to the Gulf of Mexico, and have been successfully introduced on the Pacific coast. In recent years the annual catch in the United States has equaled about 25,000,000 pounds.

SHAD FLY. See MAY FLY.

SHADOW. See LIGHT.

SHAF'TER, WILLIAM RUFUS (1835-1906), an American soldier who distinguished himself as commander of land operations in Cuba during the Spanish-American war in 1898. He was born at Galesburg, Mich., and was reared on a farm. At the outbreak of the Civil War he entered the Union army, and before its close was brevetted brigadier-general for gallantry in action. After that war he entered the regular army serving in various posts until the outbreak of the Spanish-American War. In that brief conflict he commanded operations which resulted in the surrender of the Spanish army at Santiago. Later he commanded various departments, and retired, in 1901, with the rank of major-general.

SHAFTESBURY, *shafts' bur ri*, ANTHONY ASHLEY COOPER, First Earl of (1621-1683), an English statesman and philanthropist. He was a member of the parliaments of 1640, and at the time of the Civil War joined the Parliamentary cause, after having shown slight royalist leanings. He had a prominent position under Cromwell during the Protectorate, but after Cromwell's death he saw that a restoration of the legitimate monarchy was what the country really wished and used his influence to that end. Charles II created him first Baron Ashley, and later made him Earl of Shaftesbury. He served as Chancellor of the Exchequer and as a member of the hated Cabal. In 1679 he became president of the council, and in the same year succeeded in passing the Habeas Corpus Act. Shaftesbury was largely responsible for the revision of the lunacy laws and administration, and did much to improve the condition of factory workers. Because of his connection with treasonable plots, he was compelled to flee to Holland, where he died. He is the Achiophel of Dryden's *Absalom and Achitophel*.

SHAGREEN', a kind of untanned leather, with a rough surface, prepared from skins of horses, oxen, asses and camels. The hides are soaked and laid on a flat surface, and small, hard seeds are sprinkled over them. A board is then pressed on them to force the seeds into the skins. After the skins are dry the seeds are shaken out and the rough surface is trimmed and pared. The skin is soaked a second time, and the depressed parts rise, producing the surface roughness. The

leather is then dyed. The skins of shark, sea otter, seal and other animals have also been used for making this leather. Shagreen was formerly employed for covering sword scabbards; it is now used to a limited extent as a covering for camera boxes, instrument cases and various like articles.

SHAH JEHAN, *shah je hahn'* (about 1592-1665), the fifth Mogul emperor of Delhi, India, who reigned from 1627 to 1658, when he was deposed by his son Aurungzebe. During his reign the Mogul Empire attained great magnificence. He founded Delhi, where he erected a group of splendid buildings which constituted the imperial palace, one of which housed the celebrated peacock throne. He built the Pearl Mosque and the Taj Mahal, at Agra, as a mausoleum to his favorite wife. See **TAJ MAHAL**.

SHAKERS or **SHAKING QUAKERS**, a sect which arose at Manchester, England, about 1747, and which has since been transferred to America. The formal designation which they give themselves is the United Society of Believers in Christ's Second Appearing, that of Shakers was given to them in ridicule because they shook their bodies during their religious services.

The founder of the sect as it at present exists was Ann Lee, an expelled Quaker, born in Manchester in 1756. She came to America in 1774 with seven followers and formed the first settlement at Watervliet, near Albany, N. Y. In 1787 the society was made communistic, the first organization on that basis in the United States. There are now (1919) seventeen communities in America, mainly in the New England states.

Shakers beliefs are similar in many respects to those of the Quakers. They believe in the immediate revelations of the Holy Ghost (gifts); maintain that the old law is abolished, the new dispensation begun; that intercourse between heaven and earth is restored; that God is king and governor; that the sin of Adam is atoned and that man is made free from all errors except his own; that every human being will be saved; that the earth is heaven, now soiled and stained, but ready to be brightened by love and labor into its original state.

At first the religious ceremonies were of the most violent, wild and irregular nature—leaping, shouting and clapping of the hands; now the Shakers move in a regular, uniform dance, to the singing of a hymn, and march

around the hall of worship, clapping their hands in regular time. The societies are divided into smaller communities, called families, each of which has its own male and female head. Celibacy is enjoined upon all, and married persons on entering the community must live together as brother and sister. All property is held in common, and all bind themselves to take part in the family business—the men either as farmers, builders, gardeners, smiths, painters, or as followers of some other handicraft; the women engage in some household occupation or in the work of education, and never interest themselves in political affairs.



SHAKESPEARE, *shayk'speer*, **WILLIAM** (1564-1616), an English poet and dramatist, the greatest of English poets, one of the greatest of the world's poets.

Ancestry and Boyhood.

He was born at Stratford-upon-Avon, a town in Warwickshire. His father was John Shakespeare, a burgess of Stratford, who combined his business as a butcher, a wool-stapler and a glover, with dealings in timber and corn. His mother was Mary Arden, daughter of Robert Arden of Wilmechote, a prosperous yeoman farmer. They had eight children (four sons and four daughters), of whom William was the third. When the third child was born, and for some time afterward, the family was prosperous, for in 1568 John Shakespeare was high bailiff of Stratford. From this fact it may safely be inferred that his son received the best education which the grammar school of Stratford could give. After the school period the first absolutely authentic event in Shakespeare's life is his marriage with Anne Hathaway, daughter of a yeoman in the hamlet of Shottery, near Stratford. The marriage bond is dated November 28, 1582, at which date Shakespeare was in his nineteenth year, while, from the date on her tombstone, it is known that his wife was eight years older. On May 26 following, their first child, named Susanna, was baptized, and in February of 1585, a son and daughter were born, who received the names of Hamnet and Judith.

Begins His Literary Career. From this date until Shakespeare was established in London as a player and dramatist, there is a gap of seven years, during which we are again left to tradition and conjecture. To account for his leaving Stratford it has been suggested that his marriage with Anne Hathaway had proved unsuitable and unhappy, but there is no positive evidence in support of this belief. Then, again, there is the famous legend of the deer stealing, for which it is said he was prosecuted by Sir Thomas Lucy, of Charlecote. In retaliation he wrote, according to Rowe, a satirical ballad, which so enraged the baronet that Shakespeare thought it prudent to leave Stratford. The more probable reason is that his increasing domestic responsibilities, together with the acquaintance he presumably had with the players from London who visited Stratford, induced him to push his fortune in the city. He soon became a well-known player and a dramatist of such distinction as to call forth an envious reference in 1592 from a fellow dramatist. This is found in *A Groatworth of Wit*, written by Robert Greene, and published a few weeks after his death by Chettle.

Growing Fame and Prosperity. The first certain date in Shakespeare's life after his arrival in London is 1593. In that year he published his *Venus and Adonis*, with a dedication of this, "the first heir of my invention," to Henry Wriothesly, Earl of Southampton; and in the following year he dedicated to the same patron his other poem of *The Rape of Lucrece*. As suggesting that this patronage was substantial in its nature, there is a story to the effect that the earl at one time gave to Shakespeare £1,000 (\$5,000) to complete some purchase he had on hand. Whatever truth there may be in the story, it is certain that about this time Shakespeare began to grow in fortune and in fame. In connection with this increase of fortune it is noteworthy that the affairs of his father, John Shakespeare, seem also to have improved, for in 1596 he applied at the herald office for a grant of arms, which application was conceded in the following year. In 1596 Shakespeare's only son Hamnet died and was buried at Stratford, where the family continued to reside. The tradition is that Shakespeare visited his native town once a year during the time that he lived in London. However this may be, it is clear that

his interest in Stratford was not founded entirely in sentiment or family affection, for in 1597 he bought there a substantial house, called New Place, and in a return of grain and malt he is described as the holder of ten quarters. There is also documentary evidence to prove that he was possessed of property in the parish of Saint Helen's, Bishopgate.

While these things indicate the growth of his material prosperity, there is proof that his fame as a lyrical poet and dramatist was also being securely established, for in 1598 there was published the *Palladis Tamia*, by Francis Meres, in which twelve of his plays are enumerated, and in which mention is made of his "sugared sonnets among his private friends." Yet, notwithstanding this literary activity, he was still a player, for when Jonson's comedy of *Every Man in His Humor* was produced in 1598, Shakespeare took part in the performance. In the following year he was a shareholder in the Globe Theater, and his practical turn is still further evidenced by the fact that he bought (1602) 107 acres of arable land in the parish of Old Stratford for £320 and acquired (1605) for £440 the unexpired term of a lease of the tithes of Stratford, Old Stratford, Bishopton and Welcombe. Along with these material possessions he received the style and title of William Shakespeare, Gentleman, of Stratford-upon-Avon; but in London he was still a player in 1603, since when Ben Jonson's play of *Sejanus* was produced in that year, Shakespeare occupied a place in the list of actors. His father had died in 1601; his eldest daughter Susanna had married, in 1607, a practicing physician named John Hall; in the same year his brother Edmund, who was also a player, died in London and was buried in Southwark, and in 1608 his mother, Mary Shakespeare, followed her husband to the grave. In February, 1616, his youngest daughter, Judith, married.

Death and Burial. On the twenty-fifth of March, 1616, Shakespeare executed his will; and in another month he was dead. The cause of his death is unknown, but in Stratford there was a tradition "that Shakespeare, Drayton and Ben Jonson had a merry meeting and, it seems, drank too hard, for Shakespeare died of a fever there contracted." By his will he left the bulk of his property to Susanna Hall and her husband, his daughter Judith, his sister Joan and his godson, while

Outline on Shakespeare

BIRTH.

1. Born at Stratford-on-Avon, 1564.

PARENTS.

1. Of humble origin; respectable tradespeople; financially well-to-do.
2. His mother was Mary Arden.

EDUCATION.

1. Best education grammar school offered.
2. Studied humanity and nature.

MARRIAGE.

1. Nineteen years of age.

EARLY CAREER.

1. In 1592 established in London, engaged in literary work, and also took some of the leading parts in plays.

CHARACTER.

1. Ben Jonson said: "I loved the man and do honor to his memory, on this side idolatry, as much as any. He was indeed honest and of an open nature; had an excellent phantasy, brave notions and gentle expressions."

WRITINGS.

1st Period.

- a. Experimenting in characterization; looseness in construction. Feeling after his powers and testing them.
- b. Writings—Love's Labor Lost, The Comedy of Errors, A Midsummer Night's Dream, Richard III.

2d Period.

- a. With increased assurance follow his brilliant portrayal of English history and comedy of life in general, and one great romantic tragedy, King Richard II.
- b. Writings—Parts I and II of Henry IV, King John, Romeo and Juliet, The Merchant of Venice, Much Ado About Nothing, As You Like It, etc, etc.

3d Period.

- a. Master of all the resources of his art.
- b. Personal experiences portrayed in writings. Comedy becomes bitter; tragedies black with human experiences.
- c. Writings—Measure for Measure, Julius Cæsar, Hamlet, King Lear, etc., etc.

4th Period.

- a. Attained serenity of mind, enabling him to write his last romantic plays.
- b. Writings—Cymbeline, The Winter's Tale, The Tempest, King Henry VIII.

DEATH.

1. Died in 1616.
2. Buried in Stratford church; a monument with bust and epitaph was soon afterward set up.

NONDRAMATIC WRITINGS.

1. Venus and Adonis, The Rape of Lucrece, Sonnets, A Lover's Complaint.

a few friends and fellow players were also remembered. To his wife he bequeathed specifically the "second best bed with the furniture," for there would probably be ample provision made for her, as a widow had right of dower in her husband's freehold property. He was buried in the chancel of Stratford church, on the north wall of which a monument, with bust and epitaph, was soon afterward set up. Over his grave was placed a slab with the inscription:

Good frend, for Jesus sake forbear
To digg the dust enclosed heare;
Bleste be the man that spares thes stones
And curst be he that moves my bones.

Tradition says that these words were written by Shakespeare himself shortly before his death, but of this there is no proof. As for Shakespeare's character, as estimated by his contemporaries, it found fit expression in the words of Ben Jonson. "I loved the man," he said, "and do honor to his memory, on this side idolatry, as much as any. He was indeed honest, and of an open and free nature, had an excellent phantasy, brave notions and gentle expressions."

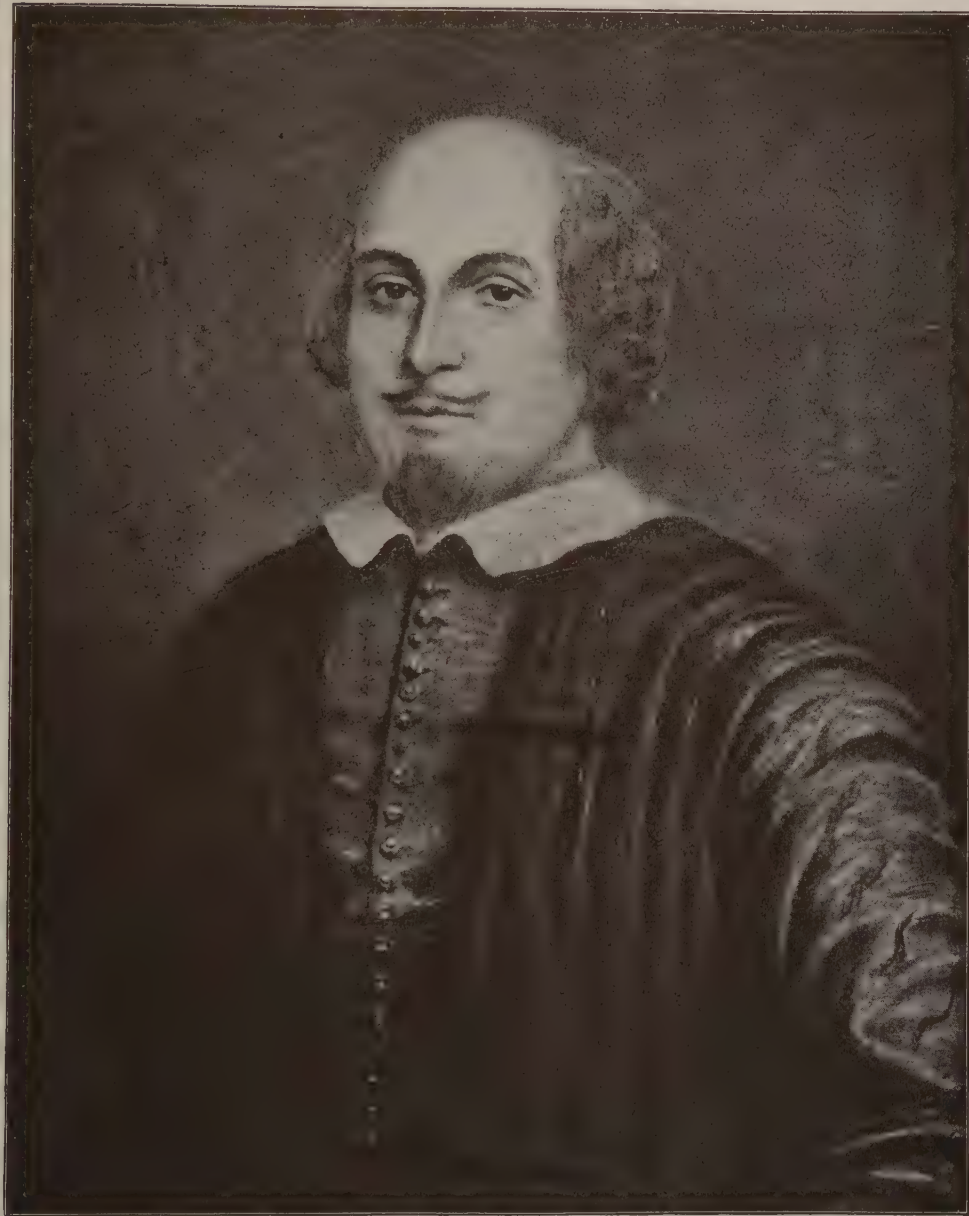
The Plays. In classifying the plays of Shakespeare by the aid of such chronology as is possible, modern critics have found it instructive to divide his career as a dramatist into four marked stages. The *first period* (1588-1593) marks the inexperience of the dramatist and gives evidence of experiment in characterization, looseness in the construction of plot, with a certain symmetrical artificiality in the dialogue. To this stage belong *Titus Andronicus* and Part I of *Henry VI*, both of which, it is thought, Shakespeare merely retouched; *Love's Labour Lost*; *The Comedy of Errors*; *The Two Gentlemen of Verona*; *A Midsummer Night's Dream*; parts II and III of *Henry VI* in which it is thought probable that Marlowe had a hand, and *King Richard III*. The *second period* (1594-1601) is that in which, with increased security in his art, the dramatist sets forth his brilliant pageant of English history, his brightest conception of the comedy of life and more than proves his capacity for deeper things by one great romantic tragedy. To this stage belong *King Richard II*, parts I and II of *Henry IV*, *King Henry V*, *King John*, *Romeo and Juliet*, *The Merchant of Venice*, *The Taming of the Shrew*, *Merry Wives of Windsor*, *Much Ado About Nothing*, *As You Like It* and *Twelfth Night*.

The *third period* (1602-1608) shows that the dramatist, having mastered all the resources of his art and tasted life to the full, is strangely fascinated by mortal mischance, so that even his comedy becomes bitter, while his tragedy is black with the darkest tempests of passionate human experience. To this stage in his development belong *All's Well That Ends Well*, *Measure for Measure*, *Troilus and Cressida*, *Julius Caesar*, *Hamlet*, *Othello*, *King Lear*, *Macbeth*, *Anthony and Cleopatra*, *Coriolanus* and *Timon of Athens*. The *fourth period* (1609-1613) is that in which Shakespeare, after having passed through a season which was probably darkened by his own personal experiences, attained the glad serenity of mind which enabled him to write his last romantic plays. To this period belong *Pericles*, which is only partly from Shakespeare's hand, *Cymbeline*, *The Winter's Tale*, *The Tempest* and *King Henry VIII*.

Other Writings. Of non-dramatic pieces Shakespeare was the author of *Venus and Adonis*, *The Rape of Lucrece*, the *Sonnets* and *A Lover's Complaint*. It is agreed that only a few of the poems in the collection published under the name of *The Passionate Pilgrim* were written by him. There has been much discussion as to how many of the plays usually credited to Shakespeare were really written by him, and systematic attempts have been made to prove that Bacon, not Shakespeare, was the author of the greater part of them. Such a theory is generally regarded as without foundation. See halftone, STRATFORD-UPON-AVON.

SHALE, the solidified mud of past geological ages. It has a slaty structure and usually contains a large proportion of clay. Shale is frequently found deposited between seams of coal and commonly bears fossil impressions. The variety known as bituminous shale burns with flame and yields an oil, which, mixed with paraffin, is of great commercial importance. Alum is manufactured from alum shales.

SHALER, NATHANIEL SOUTHGATE (1841-1906), an American geologist, educator and author, born in Newport, Ky. He was graduated from the Lawrence Scientific School of Harvard University, served for a time in the Federal army during the Civil War, and later became dean of the Lawrence Scientific School. For seven years he had charge of the geological survey of Kentucky, and in 1884



WILLIAM SHAKESPEARE

From the portrait, Stratford-upon-Avon, England

"Myriad-minded Shakespeare," the greatest literary genius of all time and all lands. He speaks a universal language and makes a supreme appeal to all people. Next to the Bible he has informed the heart and mind of mankind during the three centuries since his death.

"His life was gentle; and the elements
"So mixed in him that Nature might stand up,
"And say to all the world, THIS WAS A MAN!"



STRATFORD-UPON-AVON

Immortal Shakespeare's birthplace. In this pleasant country, by this gently-gliding stream, the dramatist and poet revelled in that close association with nature which made him so appreciative an interpreter of her many moods



SHAKESPEARE'S BIRTHPLACE

A typical example of house architecture in "the brave days of Elizabeth." The house as it appears today (restored). For all who speak the English tongue, this house will be forever a shrine

joined the staff of the United States Geological Survey of the Atlantic Coast Division. He was the author of many books, notably *The United States of America; A Study of the American Commonwealth; Aspects of the Earth, Sea, and Land; First Book in Zoölogy; Man and the Earth, and Outlines of the Earth's History.*

SHAMANISM, *shah'man iz'm*, a general name applied to the idolatrous religions of a number of barbarous nations in Northern Europe and Asia. The *shaman* is a priest who performs sacrifices and works magical spells to keep the populace on good terms with the gods. In addition to belief in a supreme being, the worshipers add the belief that the government of the world is in the hands of a number of secondary gods, whom it is necessary to propitiate by magic rites and spells. The "medicine man" of North American Indian, with his uncanny rites, exerted a similar influence.

SHAMO'KIN, PA., in Northumberland County, forty miles nearly north of Harrisburg, on the Philadelphia & Reading and the Pennsylvania railroads. It is in the anthracite coal fields and also contains foundries, machine shops, silk and knitting, flour and planing mills, skirt and hose factories and wagon shops. There is a Carnegie Library. The town was laid out in 1835, and the borough was incorporated in 1864. Population, 1910, 19,588; in 1917, 21,274 (Federal estimate).

SHAM'ROCK, the national emblem of Ireland, said to have been used by Saint Patrick to exemplify the doctrine of the Trinity, its three divisions illustrating his idea that the Father, the Son, and the Holy Spirit can be three and yet be one God.

The shamrock has a leaf which has three leaflets. It is generally supposed to be the plant called white clover, but others think it to be the wood sorrel. The plant commonly called the shamrock in Ireland is one of the hop clovers, a slender, trailing species, with small, yellow heads.

SHANGHAI, *shahng hi'*, CHINA, the most important commercial center of the country, situated 160 miles east-southeast of Nanking, on the left bank of Hwang-pu, by which it is joined to the Yang-tse-kiang. The Chinese part of the city is enclosed within a wall about twenty-four feet high. In this part the streets are narrow and dirty and the buildings are low and crowded together; but north and

northeast of the Chinese quarter is a large foreign settlement, occupied by British, French, Germans and Americans. Along the water front this part of the city presents the appearance of a modern European or American town. It has theaters, newspaper offices, club houses, street railways and electric light plants. A fine esplanade skirts the river and a park lies on the opposite side. This portion of the city also contains a fine cathedral, municipal offices and hospitals. The governing authorities of the foreign settlement are chosen from Americans, English and French who reside there, and the residents are under the protection of the consuls of their respective governments.

Shanghai is the eastern terminal of the Hangchow and the Nanking railroads, and one of the most important commercial centers of Asia; its annual exports and imports amounted to over \$270,000,000 before the World War. The imports are from Great Britain, India and other British colonies and consist of cotton goods, woolen goods, metals, petroleum, electrical apparatus and other machinery and numerous small wares. The exports are chiefly raw silk, manufactured silk, tea, rice, sugar, cotton, wool, paper and hides. The population in 1916 was estimated at 1,000,000, about one-half of whom live in the foreign quarters.

SHANNON, the largest river of Ireland, 250 miles in length, which flows into the Atlantic Ocean through a series of beautiful lakes, or loughs, along the southwestern coast. In the last sixty miles of its course, the Shannon becomes a tidal estuary, which at Limerick is thirteen miles wide. The river is navigable from Lough Allen to Limerick; two canals which connect it with Dublin have greatly increased its importance.

SHANTUNG, *shahng toong'*, a province on the east coast of China, the eastern part of which is a mountainous peninsula projecting into the Yellow Sea. On the Shantung promontory is the district of Kiao-chan, which China, under compulsion, leased to Germany in 1898. In 1914 Japan, as an ally of Great Britain, seized the district, and in 1915 the Japanese obtained from China all privileges which Germany had enjoyed. These rights were retained by Japan after the World War, by the terms of the Treaty of Versailles (see VERSAILLES, TREATY OF). At the Washington arms conference in 1921 Japan agreed to withdraw from the province.

Shantung province has an area of 55,970 square miles, about that of the state of Wisconsin, and a population of 38,247,000. It is of economic value chiefly because of its mineral resources, which include four great coal fields and profitable iron mines. During the period of German concession a railway was built from Tsing-tau to Weihien, and westward to Tsinan-fu. All German leases are now held by Japan, which, however, does not hold political sovereignty over the province. Shantung is of historic interest as containing the birthplace and the grave of Confucius. See KIAO-CHAU; WORLD WAR.

SHARK, a group of flesh-eating fishes, the largest, most formidable and voracious of deep-sea monsters. They are common in almost all oceans, although most abundant in warm waters. The body is rounded and tapering, and is sometimes forty feet or more in length. The mouth is large, and is armed with several rows of compressed, sharp-edged teeth. The body is covered with a rough skin, and instead of scales, it has many tiny denticles. This skin is called *shagreen*, and it has a commercial value as a polisher of wood of fine grain, and as a covering for boxes (see SHAGREEN).

Sharks swiftly pursue other marine animals, and seem not to care whether their prey be living or dead. They often follow vessels and shoals of fishes in their periodical migrations.

Species of Sharks. The largest species is the *whale shark*, often more than fifty feet long. The *basking shark*, found chiefly in the Arctic Ocean; sometimes attains the length of forty feet, but it is not as ferocious as others of this group. The *white shark* is one of the most formidable and voracious; it is common in many of the warmer seas, reaching a length of over thirty feet. The *hammer-headed sharks*, which are chiefly found in tropical seas, are very voracious and often attack man. They are noteworthy for the remarkable shape of the head, which resembles somewhat a double-headed hammer, the eyes being at the extremities. Other forms are the *porbeagle*, the *blue shark*, the *fox shark*, the *sea fox*, the *sea ape*, or *thresher*, and the *Greenland*, or *northern*, *shark*. In China and Japan the smaller sharks serve as food, and in China and India the fins form an important article of commerce, as they contain a gelatin used in making soup. Oil is made from the livers of some species.

Shark Fishing. Shark fishing constitutes an important industry on the coasts of Lapland and Norway, as well as China, India and Africa. In Norway sharks are caught about 150 miles from the coast. Near the fishing boat a barrel pierced with holes and filled with oil is sunk. The oil attracts the shark, which is then caught by chains and hooks baited with salted seal meat. A great struggle ensues between man and the powerful monster before it is stunned by repeated heavy blows upon the head.

SHARON, *shair'on*, PA., in Mercer County, seventy-five miles northwest of Pittsburgh, near the Ohio boundary line, on the Shenango River and on the Pennsylvania, the New York Central, the Pittsburgh & Lake Erie and the Erie railroads. Coal is extensively mined in the vicinity, and there are rolling mills, furnaces, foundries, boiler works, machine shops and other factories. Stone quarrying is also an important industry. It was a munitions center during the World War. It was settled in 1795, and incorporated in 1841. Population, 1910, 15,270; in 1920, 21,747, a gain of 42 per cent.

SHAS'TA, MOUNT, a lofty, snow-covered conical mountain, rising 10,000 feet above the plains of the Sacramento Valley, is a peak of the Sierra Nevada range of California, the summit of which is perpetually covered with snow. It is a typical volcanic mountain, attains the height of 14,350 feet above sea level, and is formed of two peaks. About 1,400 feet below the summit is a crater three-fourths of a mile in diameter and 2,500 feet deep. On the northern slope glaciers of considerable size are found. Other glaciers have left traces of their former existence in many glacial lakes and ponds.

SHAW, ALBERT (1857-), an American publicist and editor, born at Shandon, Ohio, and educated at Iowa (now Grinnell) College and at Johns Hopkins University. After several years of editorial writing and study abroad, in 1890 he established the *American Review of Reviews*, and as editor of the publication became known as one of the foremost editors of current-events periodicals. As a writer on political science he became equally well known. Among his books on municipal government and economics are *Coöperation in the Northwest*, *Municipal Government in Great Britain*, *Municipal Government in Continental Europe* and *Local Government in Illinois*.

SHAW, ANNA HOWARD (1847-1919), an American physician, lecturer and writer. Although an Englishwoman by birth, she was an American by education and long residence, having lived in the United States from early childhood. She was educated at Albion (Mich.) College and at Boston University, and received a medical and a theological degree. She was ordained in the Protestant Methodist Church in 1880, and she spent many years in the pulpit. Dr. Shaw gained her greatest prominence as an advocate of and lecturer on woman suffrage, chiefly from 1904 to 1915. In the latter year she published her autobiography, *The Story of a Pioneer*. During the World War she served as chairman of the Woman's Advisory Committee of the Council of National Defense. She died in the midst of active labors.

SHAW, GEORGE BERNARD, (1856-), a prominent Irish critic, essayist and dramatist. He was born in Dublin and in 1876 settled in London, where his critical writings soon brought him recognition. He took an active interest in politics as an advocate of Socialism, was an early member of the Fabian Society and gained notoriety as a pamphleteer and street orator. He wrote four novels—*The Irrational Knot*, *Love among the Artists*, *Cashel Byron's Profession* and *An Unsocial Socialist*—all of indifferent merit. In 1920 and 1921 he published *Heartbreak House* and *Back to Methuselah*. Of his critical writings, *The Quintessence of Ibsenism* and *The Perfect Wagnerite* are noteworthy. His first play, *Widowers' Houses*, produced in 1892, was followed by about twenty works for the stage, hardly any of which can properly be called plays, inasmuch as they ignore many principles of dramatic construction. His characters rarely feel or act; they merely argue usually on some social problem—and there is no emotional dramatic action. The plays which have aroused most interest are *The Philanderer*, *Candida*, *Major Barbara*, *Man and Superman*, *The Doctor's Dilemma*, *Getting Married*, *The Shewing-Up of Blanco Posnet* and *Fanny's First Play*.



GEORGE BERNARD
SHAW

SHAWNEE, an Indian tribe of Algonquian stock, who lived originally in South Carolina along the Savannah River. The Shawnees were vigorous and warlike, and numbered among their chiefs the famous Tecumseh (which see). They made unsuccessful attempts to resist white settlement. There are now about 1,400 in Oklahoma.

SHAWNEE, OKLA., in Pottawatomie County, nearly forty miles southeast of Oklahoma City, on the North Canadian River and the Atchison, Topeka & Santa Fé, the Chicago, Rock Island & Pacific and the Missouri, Kansas & Texas railroads. The Chicago, Rock Island & Pacific shops are located here and furnish work for hundreds of workmen. There are cotton gins and compresses and oil mills. The city has the Baptist University, the Catholic University and a Carnegie Library. Population, 1910, 12,474; in 1920, 15,348.

SHAYS' REBELLION, an insurrection in Western Massachusetts in 1786-1787, precipitated by the financial distress which followed the Revolutionary War. The special grievances of the insurgents were the high salaries paid to officials, excessive taxes and exorbitant fees of lawyers and officers. In September, 1786, a mob of about six hundred men gathered at Springfield under Daniel Shays, forced the supreme court to adjourn and attempted to capture the arsenal. The state militia under General Benjamin Lincoln soon overwhelmed them, and by February the revolt was quelled. Ten of the leaders were condemned to death, but were later pardoned by Governor John Hancock.

SHEBOYGAN, Wis., the county seat of Sheboygan County, fifty-two miles north of Milwaukee, on Lake Michigan, at the mouth of the Sheboygan River, and on the Chicago & North Western railroad. It is an important shipping point for the surrounding farming and dairying section. There are large cheese warehouses, coal docks, fisheries, chair and furniture factories, foundries, machine shops, carriage works, a piano factory, brickyards and various other establishments. The city has a state fish hatchery, a public library, a good Federal building, a county asylum for the insane, a home for the friendless and the Saint Nicholas hospital. There are two parks. The place was settled in 1836, the village was incorporated in 1846, and the city was chartered in 1853. Population, 1910, 26,398; in 1920, 30,955.

SHEEP, a cud-chewing animal, closely related to the goat, and one of the most useful of domesticated animals. Its wool is made into clothing, its skin is manufactured into leather and its flesh and milk are used for food. There are a number of varieties, but all are included under the classes known as coarse-wooled, medium-wooled and fine-wooled.

Breeds. There are numerous varieties of domestic sheep, but all can be classified under the following groups.

Coarse-Wooled. These breeds are characterized by their long, coarse wool, white faces and legs and straight backs. Their long wool makes them appear larger than they really are. The *Cotswold* is the long-wooled variety best known in America. Other varieties, common in the United Kingdom, are the *Leicester* and the *Lincoln*.

Medium-Wooled. The medium-wooled breeds are usually large in size and have compact fleeces, the wool being about one-half the length of that of the coarse-wooled breeds. One of the best known of these is the *Southdown*, which is easily distinguished by its large, compact body and its brown face and legs. Other valuable medium-wool breeds are the *Hampshire* and the *Shropshire*, both

states, particularly in Montana, Wyoming and Arizona. The *Rambouillet*, imported from France, is larger and stronger than the Merino, and is fast becoming a favorite with American growers.

Other Breeds. There are numerous other breeds of sheep, but with one or two exceptions they are of no economic importance. One of these is the sheep from which the so-called fur known as *astrakhan* and *Persian lamb* is obtained. The wool of this sheep is very fine and curly, which gives these furs a peculiar appearance. It is not known from what wild species the domestic varieties were bred. Wild sheep, such as the *Bighorn*, of the Rocky Mountains, are still found in the mountainous regions of Europe, Asia and America. It is probable that all wild sheep had horns, but they have now disappeared from the ewes of all domestic breeds except the *Dorset* and from the rams of most breeds.

Where Sheep are Raised. Domestic sheep are found in all parts of the civilized world, but they are most extensively raised in the temperate regions, where they are kept chiefly for the wool and flesh. The first sheep were brought to America by Columbus in 1493. The Spaniards introduced them into Mexico



somewhat larger than the Southdown. The Hampshire has become a favorite breed in America. The medium-wooled breeds are valuable for both wool and mutton, and are very generally raised.

Fine-Wooled. The *Merino* is the most important of the fine-wooled breeds. This sheep was introduced into America from Spain, where it has been bred for many centuries. It is small in size and has short legs, and the skin is wrinkled about the neck and shoulders. The wool is short, very fine and quite oily. It is the most valuable wool taken from sheep, and a fine cloth is manufactured from it. The Merino is delicate and will thrive only in a dry climate. These sheep are raised in large numbers in Australia, in New Zealand and in some of the Rocky Mountain

and Florida, and from these early flocks large herds descended. Other breeds were also brought by the English into the northern colonies, so that early in the history of the country the farms were stocked with sheep. Australia, New Zealand, Argentina, the Union of South Africa, Uruguay, Russia, the United Kingdom, France, Spain, India and the United States are the chief wool-producing countries of the world. In the United States, Montana, Wyoming, New Mexico and Ohio are the leading states. There are about 50,000,000 sheep in the United States, and about 9,000,000 are slaughtered annually. The yearly production of wool is about 200,000,000 pounds. Canada has over 2,000,000 sheep. See MEAT PACKING; MUTTON; WOOL.

SHEEP LAUREL. See KALMIA.

SHEEPSHEAD, *sheeps'head*, the name of a fish abundant on the Atlantic coast of the United States, highly esteemed as a food. It receives its name from the resemblance of its head to that of a sheep. It is stout and deep-bodied, of a grayish color, with eight vertical bands and dark fins. It is rarely more than thirty inches in length.

SHEFFIELD, ENGLAND, in Yorkshire, 160 miles northwest of London, for more than two centuries noted for its manufacture of high-grade cutlery. The city is beautifully situated on hilly ground, at the junction of the Sheaf and the Don rivers. It has many fine buildings, among which are the ancient parish Church of Saint Peter's, in the Perpendicular style, recently restored; Saint Mary's Catholic Church; Albert Hall, and the Cutler's Hall. Of educational and literary institutions there are the Free Grammar School; the Church of England Educational Institute; University College, formerly the Firth College; the Wesley College; the School of Art, and the Saint George's Museum, founded by Mr. Ruskin. The trade of Sheffield is chiefly connected with cutlery, for which it has long been famous, and the manufacture of all forms of steel, iron and brass work. The steel manufacture includes armor-plating, rails, engine castings and rifles. There are also manufactures of engines, machinery, plated goods, Britannia metal goods, stoves and grates. Sheffield is supposed to have been originally a Roman station. Edward I granted it a charter as a market town in 1296. It is only since 1800 that it has developed such importance as a manufacturing center. Population, 1921, 490,724.

SHEIK, *sheek*, or *shayk*, an Arabic word meaning *aged man* or *elder*. Originally it was a title of dignity belonging to the chiefs of the Arabic tribes, but now is used among Moslems as a title of respect. The superiors of Mohammedan monastic orders and the heads of villages are sometimes called sheiks. The *grand mufti*, the head of the Mohammedan Church in Turkey, is known as the *Sheikh ul Islam*.

SHEKEL, *shek'ul*, as originally used in the Bible, is a term referring to a unit of weight. Later it was applied to the coin also. The Hebrew coin, to which reference is most frequently made, was 218 grains in weight. It is said the Jews first issued coins of their own at the time of Simon Maccabaeus, between 141 and 134 B. C. The gold shekel was worth

about \$5.69, the copper about three cents, and the silver about fifty-four cents; the latter seems to have been given most wide circulation. In present day vernacular the word has come to refer to money in general.

SHELBYVILLE, IND., the county seat of Shelby County, twenty-five miles southeast of Indianapolis, on the Blue River and on the Cleveland, Cincinnati, Chicago & Saint Louis and the Pittsburgh, Cincinnati, Chicago & Saint Louis railroads. The city is in an agricultural, stock-raising and dairying region, and it contains flour mills, carriage works, creameries, nearly a score of furniture factories, as well as lumber and planing mills, ice factories and various other works. It has a city and a county building, a hospital, a sanitarium and a Carnegie Library. The Forest Hill Cemetery is also of interest. Population, 1910, 9,500; in 1920, 9,701, a gain of 2 per cent.

SHELDON, CHARLES MONROE (1857-), an American clergyman and writer, born at Wellsville, N. Y. and educated at Brown University and at Andover Theological Seminary. In 1886 he was ordained in the Congregational ministry, subsequently filled pastorates at Waterbury, Vt., and Topeka, Kan., and ultimately became minister at large for his denomination. His experiment of editing the *Topeka Daily Capital* for one week on what he believed to be a Christian policy gained wide publicity. His books are all written with a purpose, and each illustrates some great moral principle. Some of them are *His Brother's Keeper*, *In His Steps*, *The Miracle at Markham*, *Who Killed Joe's Baby?* and *The Narrow Gate*.

SHELL, the hard outer coverings which form the chief protection of many of the lower animals. The Mollusks, the Echinodermata, the Crustacea and even certain insects, as the beetles, and certain mammals, as the armadillos, have such coverings. Perhaps the most interesting and typical shells are those of the mollusks, which are divided into two classes—the univalves (single valves) and the bivalves (two valves). The most common examples of the univalves are the shells of common snails, which assume a variety of graceful shapes and beautiful colors. Some are long spirals, tapering to a point; some are tightly wound wheels, like a watch spring, and some are short, round spirals, with wide openings. Some of these shells are delicate, with a pearly luster, while others are heavy.

Of the bivalves—shell formed of two parts, joined by a hinge—the best examples are the clam and oyster shells. The most easily noted characteristics of these very common shells are the different layers of which they are composed—the outer horny layer, or epidermis, and the beautiful inner pearly layer. There are endless varieties of both univalve and bivalve shells, some so small as to be indistinguishable as shells, some very large; and all of these have been put to many uses. They have been used as ornaments by civilized and uncivilized peoples, as material for the making of buttons and other objects, and as money. The study of shells and of shelled animals is called *conchology*.

Related Articles. Consult the following titles for additional information:

Abalone	Cowrie	Mussel
Cameo	Mollusca	Nautilus
Clam	Mother-of-	Oyster
Conch	Pearl	Snail

SHELL, originally a hollow projectile, filled with a bursting charge of gunpowder or other explosive composition and fitted with a fuse by which to fire it at the desired time. Shells are usually made of cast iron or steel, and are elongated.

There are many different kinds and sizes, and the meaning of the term has been expanded to include all projectiles fired from cannons. Shells used in field artillery are constructed differently from those used in the navy. Projectiles used in the navy are designed to penetrate the steel armor of warships, and are very heavy. They have a sharp point and are tempered to the highest degree of hardness. A 12-inch gun fires a projectile weighing 981 pounds, and a 14-inch gun, one weighing 1,400 pounds, for an average distance of twelve miles, although in the World War the Germans built a gun which projected a shell over seventy-five miles, into Paris. Such a projectile has a striking force that will penetrate any armor.

SHELLEY, PERCY BYSSHE (1792–1822), an English poet born at Field Place, Horsham, Sussex, the son of Sir Timothy Shelley, a landed proprietor of ancient family. He was educated at Sion House Academy, Brantford, at Eton and at University College, Oxford. At Sion House and at Eton on account of his temperament he was persecuted by his fellows, and thus he early began to show that fierce hatred of oppression which characterized him throughout his life. While at Oxford he showed himself possessed of

uncommon literary ability; but he fell into disfavor with the authorities on the publication of a pamphlet called *The Necessity of Atheism* and was expelled. In 1811, shortly after his expulsion from college, he eloped to Edinburgh with Harriet Westbrook, the daughter of a retired innkeeper, but sixteen years of age. The marriage turned out unhappily, and after nearly three years of a wandering unsettled life they separated. In November, 1816, Harriet committed suicide by drowning. Shelley was deeply affected by this event, but soon after he married Mary Godwin, with whom he had visited the Continent in 1814.

Partly because his lungs were affected and partly because he feared that he should be deprived of the children of his second marriage, on account of his atheism, as he had been deprived of those of his former marriage, Shelley left England finally in March, 1818, and the whole short remainder of his life was passed in Italy. On July 8, 1822, while he was sailing in the Bay of Spezia, a storm arose and he was drowned. According to the quarantine laws of Tuscany the body was burned, and the ashes were deposited by his friends in the Protestant burying ground of Rome.

From his youth Shelley's life was a constant battle in defense of the radical revolutionary principles he had adopted. He believed in the possibility of establishing an ideal society, in which such institutions as marriage and property should be subordinate to the development of individuals. In some of his poems, *Queen Mab*, his earliest important work, written when he was eighteen, *The Revolt of Islam* and *Prometheus Unbound*, he embodied his beliefs on the reconstruction of society. The poems of Shelley, however, which have remained most popular, are characterized, rather, by a delicate fanciful beauty, than by any openly expressed spirit of revolt. Shelley was one of the great lyric poets of England, and his gift of wonderful melody, grace and lightness shows best in such poems as *Ode to the West Wind*, *The*



PERCY BYSSHE
SHELLEY

Cloud, Ode to Liberty, Ode to a Skylark, To Night and Lines to an Indian Air.

SHENANDO'AH, Pa., in Schuylkill County, 105 miles northwest of Philadelphia, on the Pennsylvania, the Lehigh Valley and the Philadelphia & Reading railroads. There are also electric railways to neighboring towns. It is in a rich anthracite coal field, and mining is the principal industry. The Greek Catholic church here was one of the first of that denomination, to be established in the United States. The borough has a public library, national banks, a savings bank and building and loan associations. It was settled in 1850 and was incorporated in 1866. Population, 1910, 25,774; in 1920, 24,726, a loss of 4 per cent.

SHENANDOAH RIVER, a river of Northwestern Virginia, 300 miles in length, flowing northeastward into the Potomac, which it enters at Harper's Ferry. Its valley, formed by the Blue Ridge and central Appalachian Mountains and noted for its fertility and beauty, was the scene of numerous military operations during the Civil War. See **SHERIDAN**, **PHILIP HENRY**.

SHEPARD, **HELEN GOULD** (1868-), an American philanthropist, the eldest daughter of Jay Gould. Among the first of her famous benevolencies was a gift of \$100,000 to the United States government at the opening of the Spanish-American War, for improvement in the equipment of the hospital and commissary service, and a donation of \$50,000 for military hospital supplies. A library building and an engineering school to New York University, the naval branch building and equipment of the Brooklyn Y. M. C. A. and a fund for improvements at Rutgers College, the total amount approximating a quarter of a million dollars, are among her other donations. Many smaller gifts have been made to various causes. Miss Gould was married to Finley J. Shepard, a railway official in 1913.

SHEPHERD DOG, the general name of a group of dogs, of which the finest breed is the Scotch collie, employed originally by shepherds to assist in tending flocks. The small Spitz, or Pomeranian, also belongs to this family. The shepherd dog generally is large, of powerful, lithe build, and is remarkable for its intelligence and usefulness. The tail is rather long and possesses a bushy fringe, the muzzle is notably sharp, and the eyes are large and bright. See **COLLIE**.

SHERATON, *sher' a ton*, **THOMAS** (1751-1806), an English designer of furniture which bears his name, was born at Stockton-on-Tees. He went to London in 1790 and soon after published his books, *Cabinet-Maker and Upholsterers' Director*, *Cabinet Dictionary*, and *The Cabinet-Maker, Upholsterer and General Artists' Encyclopedia*, each profusely illustrated with engravings and colored plates of the designs with which his name has become identified. He was always extremely poor, and never seems to have had a shop of his own, although his books had a wide circulation and much furniture was made from his original designs. Sheraton's name will always be connected with furniture decorated with painted designs. He was also noted for his use of inlay. See **FURNITURE**.

SHERBROOKE, *shur'brook*, **QUE.**, at the junction of the Saint Francis and Magog rivers, 101 miles east of Montreal, on the Canadian National, and Boston & Maine railroads. The rivers furnish good water power, and the city is quite an important industrial center. Among the leading manufactures are woolen cloths, flour, foundry products, tools, lumber, wood pulp, paper and malt liquors. Population, 1921, 23,515.

SHERIDAN, **WYO.**, the county seat of Sheridan County, on the Chicago, Burlington & Quincy Railroad. Coal is mined in the vicinity, the city is a stock-shipping point, and there are manufactures of agricultural implements. A Carnegie Library and a state hospital are here. The town was settled in 1882, and was incorporated in the next year. Population, 1910, 8,408; in 1920, 9,175, a gain of 9 per cent.

SHERIDAN, **PHILIP HENRY** (1831-1888), an American soldier, probably the greatest cavalry leader of the Civil War, born in Albany, N. Y. He was graduated at West Point Military Academy in 1853, and from 1855 to 1861 served on the frontiers of Texas and Oregon. At the outbreak of the Civil War he was a captain in the Thirteenth Infantry, but in the following year he was made colonel of the Second Michigan Cavalry. Later in the year he was placed in command of the Army of the Ohio, and in the battles of Perryville, Murfreesboro, Chickamauga and Chattanooga, he showed the greatest ability and bravery. In April, 1864, Grant appointed him chief of cavalry of the Army of the Potomac, and he made several daring cavalry raids into the Shenandoah Valley.

His ride from Winchester to Cedar Creek, a distance of twenty miles, which turned a Federal defeat into a brilliant victory, is his most famous exploit. During the final advance upon Richmond he was Grant's right-hand man. He fought the Battle of Five Forks, which necessitated Lee's evacuation of Richmond and Petersburg; and as Lee fled he constantly harassed and attacked him, until he compelled his surrender at Appomattox Court House,



PHILIP SHERIDAN



PHILIP SHERIDAN

SHERIDAN, RICHARD BRINSLEY BUTLER (1751-1816), a British dramatist and statesman, born in Dublin. His first famous comedy, *The Rivals*, was produced in 1775, and this was followed by *The Duenna*, a comic opera; *The School for Scandal*, the greatest English comedy which had been produced since Shakespeare; *Saint Patrick's Day*, a farce, and *The Critic*, a comedy. After the destruction by fire of his Drury Lane Theater, London, the closing years of Sheridan's life were handicapped by continued financial difficulties. His charm of personality and wit made him a conspicuous figure in London literary life and society. He also won fame as an orator during his twelve-year Parliamentary career, especially for his speeches on the impeachment of Warren Hastings. Burial was in Westminster Abbey.

SHERIFF, *sher'if*, the chief executive officer of a county. In England since the early part of the fourteenth century the office of sheriff has been appointive. In the United States, there are a few states in which the sheriffs are appointed, but the office is generally elective, and cannot be held for more than two successive terms. In the two countries the duties of sheriff are practically the same. He is charged with the safe-keeping of prisoners, with the proper conduct of juries, and is expected to keep the peace. His duties include the seizure of property

when a warrant of attachment has been issued, and the sale of property to satisfy a judgment. In populous counties a sheriff has several assistants, called deputies, and there are many perquisites to his office in the form of fees, often making it highly lucrative.

SHERMAN, *shur'man*, JOHN (1823-1900), one of the most influential statesmen of his day, and author of the famous silver and anti-trust laws which bear his name. Sherman was born in Lancaster, Ohio. He was admitted to the bar in 1844, and began practice at Mansfield, from which city he was elected to Congress in 1855. As a speaker he was an acknowledged power from his early years. In 1861 Sherman became United States Senator, and as chairman of the



JOHN SHERMAN



JOHN SHERMAN

SHERMAN, ROGER (1721-1793), an American patriot, one of the signers of the Declaration of Independence, was born at Newton, Mass. As a boy he was apprenticed to a shoemaker, but in 1743 he engaged in business with his brother at New Milford, Conn., and was later admitted to the bar. Before the Revolutionary War he had served in the Connecticut legislature, as a judge of the superior court of Connecticut, and as a member of the Connecticut senate. He was a member of the committees that framed the Declaration of Independence and the Articles

of Confederation. In 1784 he was elected mayor of New Haven. While holding this office Sherman was an influential member of the Constitutional Convention at Philadelphia (1787). He was one of the first Representatives in the Federal Congress from Connecticut, and in 1791 was elected to the Senate, where he served until his death.

SHERMAN, TEX., the county seat of Grayson County, about sixty miles north of Dallas, on the Frisco, the Atchison, Topeka & Santa Fé, the Texas & Pacific, the Houston & Texas Central, the Missouri, Oklahoma & Gulf and the Saint Louis Southwestern railroads. The city has an elevation of about 1,000 feet above the sea. It is in the fertile Red River Valley, where much cotton is raised, and is not far from the Ardmore coal fields of Oklahoma. It ships large quantities of cotton and grain and contains a large cotton gin, several cottonseed oil mills, flour and lumber mills, machine shops, brick works and other factories. The higher educational institutions are the North Texas Female College, the Carr-Carleton Christian College for women, Austin College for boys and North Texas Female College (Methodist). The municipality has a Carnegie Library, a Y. M. C. A. and a Federal building, and owns and operates the waterworks. Sherman was settled in 1848, and was chartered as a city in 1895. In 1915 the commission form of government was adopted. Population, 1910, 12,412; in 1920, 15,031.

SHERMAN, WILLIAM TECUMSEH (1820-1891), an American general, born at Lancaster, Ohio, and educated at West Point Military Academy. He served in the army in Florida and Mexico, and in 1853 retired to private life. On the outbreak of the Civil War he offered his services to the United States government and was appointed colonel of the Thirtieth Infantry. He was present at the Battle of Bull Run, greatly distinguished himself at Shiloh and subsequently took a prominent part in the operations under Grant around Vicksburg and Memphis. Transferred to Tennessee, he



WILLIAM TECUMSEH
SHERMAN

rendered Grant great service in the operations around Chattanooga, and early in 1864 he led his forces in a raid across Mississippi, devastating the country from Jackson to Meridian. In March, 1864, he succeeded Grant as commander of the military division of the Mississippi, and at the beginning of May, simultaneously with Grant's advance in the East, he began his invasion of Georgia. On September 1, after a number of battles, he took Atlanta, and on December 21 entered Savannah. Then, turning northward into the Carolinas and fighting more battles, he received the surrender of General Joseph E. Johnston at Durham's Station, April 26, 1865, a surrender which brought the war to a close. Sherman was made a major-general in 1864, lieutenant-general in 1866 and general in 1869. When Grant became President in 1869, Sherman was made commanding general of the United States army. He was retired in 1884. In 1875 he published his *Memoirs*, in two volumes.

SHERRY, *sher'i*, a Spanish wine, made in the neighborhood of Jerez, in the province of Andalusia, near Cadiz, the location of the choicest vineyards of Spain. Dry sherry is the most highly prized. It is a strong wine, esteemed for its delicate flavor. Sherry is more largely imitated and adulterated than any other wine. A light white beverage, in imitation of Spanish sherry, is made in California. See **WINE**.

SHETLAND ISLANDS, a group of islands, the most northerly possession of Great Britain in Europe, lying at about the junction of the Atlantic Ocean and the North Sea, northeast of Scotland. They number about 100, of which twenty-three are inhabited, and cover an area of about 556 square miles. The largest of the Shetlands is Mainland.

The surface is rugged, and the coasts have many indentations, lined with abrupt cliffs of gneiss, sandstone and granite. The climate is variable, but moderate both as to heat and cold. Fishing forms the chief industry, the cod, the ling and the herring being leading articles of commerce. The raising of cattle, sheep and ponies is also an important industry, the Shetland ponies being especially famous. The chief agricultural products are oats and barley; in manufactures, hosiery and shawls take the lead. Interesting relics of the Stone Age (which see) are found on the Shetlands. These have been much studied by the world's scientists.

SHIELD, *sheeld*, a piece of armor carried on the left arm or in the left hand as a means of defense to ward off missiles and sword blows. Varied in form and size, it was the prime means of protection in battle from earliest times to the introduction of firearms.

In the early Middle Ages, foot soldiers as well as horses were protected by shields. Then the heraldic devices on the shields were the only means of identification of friend or foe, as in battle the men were completely incased in suits of armor (see **HERALDRY**). If held at arm's length, the shield was called a *buckler*; if swung over the arm with the arm across the body, it was known as a *target*. The shield of the ancient Greek infantry almost covered the entire body; that of the Romans was much lighter and smaller.



ROMAN SHIELDS

The Vikings hung their shields over the sides of ships when embarking upon an adventure. In the eleventh century it was customary to carry dead knights from the battlefield on their shields. The Spartan mother, upon the departure of her warrior sons for battle, bade them to return with or on their shields. In the thirteenth century the custom of hanging shields in churches was introduced.

Shields of savage races are most generally made of oxhide, which is hardened to resist penetration of spears and darts. In modern warfare the shield has an unimportant place as a protection to machine guns, and this use now, too, is on the decline. A metal shield protects those firing larger guns, such as six-inch field pieces.

SHIITES, *she'ites*, the lesser of the two great sects of Mohammedans. They do not acknowledge the *Sunna* as a law, and believe that Ali, the fourth caliph after Mohammed, was his first lawful successor. Persia is now the only Shiite nation of importance.

SHILLABER, *shil'a ber*, BENJAMIN PENHALLOW (1814-1890), an American humorist, whose amusing sketches gained wide popularity, written under the pen name of MRS. PARTINGTON. He was born at Portsmouth,

N. H., became a printer and was engaged in this occupation at Dover, N. H., and at Boston until 1847, when he joined the editorial staff of the *Boston Post*, and later the *Saturday Evening Gazette*. Among his well-known books are *Life and Sayings of Mrs. Partington*, *Paringtonian Patchwork*, *Rhymes with Reason and Without* and *Ike and His Friends*.

SHILLING, *shil'ing*, an English silver coin, equivalent in value to twelve bronze pence, or one-twentieth of a pound sterling, and approximately equal to 24.3 cents, to 1.25 French francs, and to 1.11 German marks. The convenient size and value of the English shillings made them popular in the American colonies, but, like the pound unit, in the colonies they varied greatly in value. A few coins of this denomination were issued by the colonies, notably the famous pine tree shilling of Massachusetts (which see). The shilling is still used as a money of account in parts of the United States, its most common value being about 12½ cents, or ½ of one dollar.

SHILOH, *shi'lo*, in Biblical literature a city of the tribe of Ephraim. It was one of the oldest and most sacred of the Hebrew sanctuaries. After they had subjugated Canaan, the Children of Israel erected the tabernacle there and set up the Ark of the Covenant, at which the family of Eli officiated. According to Biblical account the ungodly conduct of the sons of Eli brought about the loss of the Ark, which had been carried into battle against the Philistines. From that time Shiloh steadily declined. The only remains of the ancient village are rock tombs and a pool formed by a hollow cut in rock. The place is to-day called Seilun.

SHILOH, BATTLE OF, one of the most memorable battles of the Civil War, fought on April 6 and 7, 1862 about two miles west of Pittsburg Landing, on the Tennessee River, in Tennessee, around a log chapel known as "Shiloh Church." Grant and Sherman commanded the Federals, and A. S. Johnston and Beauregard led the Confederates. On April 6, the Confederates took the Federals by surprise and drove them from their lines, with heavy loss in men and guns; but the second day the Federals, having received reinforcements under generals Lew Wallace and D. C. Buell and largely outnumbering the Confederates, regained their first position and forced the Confederates to retreat to Corinth.

By their defeat at Shiloh the Confederates lost 10,700 men, including Gen. A. S. Johnston, and their hold on Tennessee west of the mountains. The Federal forces lost 13,000 men.

SHINGLES, thin pieces of wood used chiefly for covering the roofs of buildings. They are of the uniform length of eighteen inches, three-eighths of an inch thick at one end and tapering uniformly to about an eighth of an inch at the other end, and vary in width from three to eight inches. Shingles are packed 200 in a bunch. Roofing is measured by the square, that is, by areas of 10 feet square, or 100 square feet. Usually shingles are laid $4\frac{1}{2}$ inches to the weather. As $4 \times 4\frac{1}{2}$ equals 18, each shingle will cover 18 square inches of roof. It requires eight shingles to cover a square foot, or 800 to cover a square. But this does not allow for waste, and carpenters usually reckon 900 shingles to the square.

To find the number of shingles required to cover a roof, divide the area of the roof in square feet by 100 and multiply the quotient by 900; divide this product by 200, and the result will be the number of bunches required.

SHINNEY. See HOCKEY.

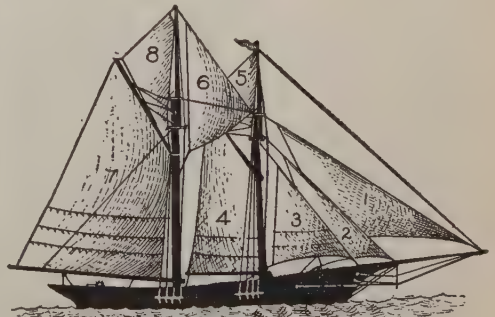
SHINTOISM, *shin'toh is'm*, the ancient religion and mythology of the Japanese, the least developed of all the great religions, having no supreme deity or moral code. In its origin it was a form of sun worship, but the essence of the religion is now ancestor worship and sacrifice to departed heroes. After the introduction of Buddhism the priests of Shintoism became magicians and fortune tellers. With the overthrow of the shogun, Shintoism again took the place of Buddhism. However, it has not been able to maintain itself as a religion, and has become rather a code of ceremonies.

SHIP. The first man to ride on the water rode astride a log. He may then have joined two logs together, to accommodate more men. Later he hollowed out the trunk of a tree to make a canoe, which was the first form of a boat. From these humble beginnings thousands of years ago, the shipbuilding industry has developed to its present gigantic proportions. There is not a body of water in the habitable parts of the earth that is not navigated by some form of water craft. Today ships bind together the nations of the earth and bring to the ports of each the products and people of all others.

There's not a ship that sails the ocean,
But every climate, every soil,
Must bring its tribute, great or small,
And help to build the wooden wall.

The term *ship* as now used applies to all large vessels upon either salt or fresh water, excepting those which ply upon rivers only. There are many patterns of ships, but all belong to one of two general classes—sailing vessels and steamships.

Sailing Vessels. Without doubt the first sail was the top of a small tree or a branch laden with foliage. From this it was not a difficult step to the use of skins of animals, which were stretched on poles that took the place of the mast in ships of later construction. However, this may be, ships with sails were in use long before we have any recorded history of civilization. The oldest sailboat or ship of which we have any record is that of the ancient Egyptians, shown in full-page illustration. It dates from a period at least 6000 B. C. A study of this picture will show that in this primitive craft are the lines and curves that, with slight modifications, are found in the hulls of modern ships. The Egyptians were not a sea-faring people, and their development of ships did not extend to sea-going craft.



A SAILING VESSEL

1. Flying jib
2. Jib
3. Fore staysail
4. Foresail
5. Fore gaff topsail
6. Main topmast staysail
7. Mainsail
8. Main gaff topsail

The Phoenicians, the greatest commercial people of antiquity, made considerable progress in the art of shipbuilding; the Romans also had a well-developed art. But with the tide of barbarism which swept over Europe at the downfall of the last great ancient empire, the science of shipbuilding was almost lost, and the Western peoples, to whom the

world's progress was henceforth entrusted, were compelled to begin anew and build up, from their own resources, new models. For more than a thousand years after the beginning of the Christian Era navigation was practically confined to the Mediterranean Sea. The first people to brave the dangers of the open ocean at that time were the Norsemen, who reached America in their Viking ships, nearly five hundred years before Columbus. These ships were long, low and narrow, and were propelled by both oars and sails. The chief events which gave impetus to the development of shipbuilding were the invention of the compass, the discovery of America and the finding of a passage to India. Spain, the great maritime nation of the early modern era, followed by France and Holland, and later still by England, made the first important advances. The last of these nations has the credit for building the first three-decker (1637), known as the *Sovereign of the Seas*. This was the most famous warship of its day. It was 168 feet long, forty-eight feet in the beam, mounted 100 guns, and cost \$1,500,000.

Between the fifteenth century and the advent of the steamship many types of sailing vessels were developed, but they can all be brought under two general classes—the *square rigged* and the *fore-and-aft rigged*. The *Sovereign of the Seas* affords a good illustration of the first, and any schooner is a good example of the second class. The square-rigged ship was the first style of merchant ship to sail on long voyages, and for more than a century it was the common carrier between maritime nations.

In The United States. The colonists in New England began to build ships and engage in foreign trade soon after they had founded their settlements, and before the outbreak of the Revolutionary War they had a good number of ships to their credit. Many of these, however, they lost during that struggle. After the independence of the United States was achieved it rapidly forged to the front and soon took the lead in the art of shipbuilding. In 1832, Scott Russell demonstrated the theoretical principles upon which the speed of ships is based, and these were immediately applied with success by both American and foreign builders. The Baltimore clipper schooners were the first results of the application of true principles of construction. They had sharp bows and deep

stern, were very long and lay low in the water, had long, slender masts and large, skillfully cut sails. The construction of vessels on these principles gave faster, safer ships than had been known before, and these played a large part in the development of the oriental trade of both England and America.

For many years the schooner was in common use for coastwise traffic and on the Great Lakes. A schooner is a fore-and-aft rigged vessel usually having two masts and a bowsprit, though the number of masts may be increased with the size of the vessel. A good schooner is a fast sailer, and can be managed by a small crew. The largest ship of this type ever constructed was a steel seven-mast schooner, 305 feet long, 50 feet beam, having a displacement of 10,000 tons and carrying 40,617 square feet of canvas.

Steamships. The first successful steamboat was the *Clermont*, invented by Robert Fulton in 1807 (see FULTON, ROBERT). Previous to Fulton's venture several attempts had been made to propel boats by steam, and one inventor, John Fitch, was successful, but his boat was small, and not commercially practical. John Stevens of New Jersey completed a steamboat soon after the *Clermont* made its first voyage. He took his boat to the Delaware River by sea, and was the first to navigate the ocean in a vessel propelled by steam. For thirty years after Fulton's invention, paddle wheels were used exclusively for propelling steamships. Between 1840 and 1845 John Ericsson perfected the screw propeller, which rapidly replaced the paddle wheel and is now almost universally employed on steamships.

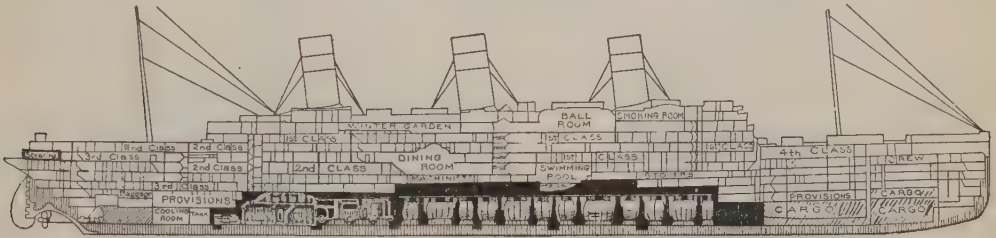
The first steamship to cross the ocean was the *Savannah*, which made a voyage to England and Russia in 1819. It used both sails and steam. Within the next twenty years steamships multiplied so rapidly that they were found on the waters of all civilized parts of the globe. Until the perfection of Ericsson's propeller the plan of using both sails and steam was followed on ocean steamships, but with the introduction of the propeller the plan of construction was radically changed, and the first steps leading to the modern ocean-going ships were taken. Previous to this change all ships were constructed of wood, but gradually iron, then steel, began to replace wood, until the wooden ship was almost driven from the seas and the Great Lakes. The emergency caused by the World

War revived for a short time the interest in wooden ships, and in 1917 and 1918 a number were built in America under the supervision of the government, but when the emergency had passed this form of construction was abandoned. Since 1917 concrete has been used in the construction of a number of ships.

Modern Steamships. The modern ocean liner of the highest type is one of the marvels of the age. It is as luxurious as a modern hotel, and carries, besides its crew, a passenger list equal to the population of a small-sized city. It is evident that the science of ship designing is at once important and intricate. The chief points to be considered are

level with the surface of the water. American and Canadian ships have the draught in feet marked in large figures (usually Roman numerals) on the bow, so that anyone can tell the draught by looking at these figures. Careful observation of the draught and the load line by the navigator is essential to safety. Many ships have been wrecked because they were overloaded.

The completion of the *Lusitania*, destroyed by a German submarine in 1915 (see LUSITANIA), and its sister ship the *Mauretania*, was considered to mark a new era in ocean transportation. Steam turbines took the place of the old-styled reciprocating



TRANSVERSE SECTION OF GREAT STEAMSHIP

The *Imperator*, sister ship of former *Vaterland*, now *Leviathan*. Length, 909 feet; beam, 98 feet; displacement, 58,000 tons; horse power 62,000; speed, 23 knots per hour (over 26 miles).

stability, capacity, strength and speed. The ship must have graceful lines, and in addition to its capacity for cargo must be able to carry a certain number of passengers. Its engines must be capable of propelling it at a certain speed, and the shape must be conducive to allowing such speed with economy of fuel; the ship must be able to stow enough coal to last during the trip at a rate of about 1,000 tons a day, for fast boats like the *Mauretania*, and about 260 tons for the larger, slower boats. The liner must be safe, but light, must withstand shocks firmly and must be built so that it will return to erect position when turned slightly to the side.

The *displacement* of the ship means the weight of the water it displaces, which weight is equal to that of the ship with cargo and passengers. The *draught* of the ship is the depth to which the lowest part of the keel sinks below the surface of the water when the boat is loaded. When the navigator says that his ship draws twenty feet of water he means that the lowest point of the keel will be twenty feet below the surface when the ship is loaded to fullest capacity. The *load line* is the plane passing through the ship on the

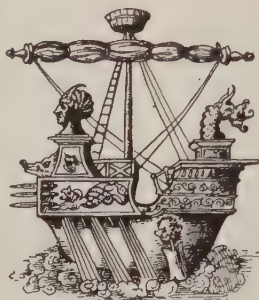
engine; each ship was driven by four propellers and made an average speed of about twenty-five knots, or nearly thirty miles, an hour. The *Mauretania* has a width of 88 feet, is 60 feet deep, has gross tonnage of 33,000 tons and a displacement of 46,640 tons. It will accommodate 550 first-class passengers, 375 second-class and 1300 third-class passengers, and requires a crew of 800. The electric lighting plant required over 200 miles of cable and a dynamo larger than that necessary for a good-sized town. Its consumption of coal averages over 1,000 tons a day, and 350 men are required to attend to the fires. This ship is fitted with every convenience and luxury that can be found in the most select hotels of Europe or the United States, as well as with the latest devices to insure safety. It makes the voyage between New York and Liverpool in less than five days.

Since the completion of the *Mauretania* the White Star line has constructed the *Olympic*, having a length of 850 feet, but that has been exceeded by the *Imperator* (909 feet) and the *Vaterland* (950 feet) built by the Hamburg-American line. At the time of its completion in 1914, the *Vaterland* was the largest ship

SHIPS IN ALL AGES



Egyptian,
about 6000 B.C.



Roman Warship



Greek Merchantman,
500 B.C.



13th Century English Ship



Columbus' Flag Ship,
the "Santa Maria."



The "Sovereign of the Seas"
Built 1638



A Galleon
of the Time of Elizabeth



The "Newcastle,"
an East Indiaman



American Four-masted
Schooner



Baltimore Clipper



The First Seven-masted Steel Schooner

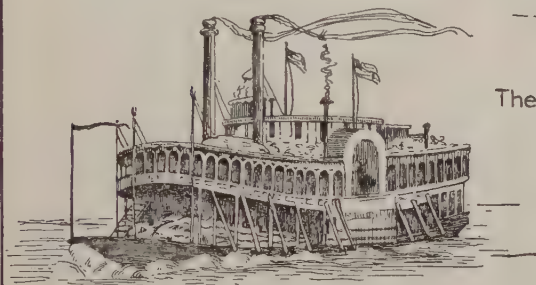
SHIPS IN ALL AGES



Fulton's Clermont
Speed, Five Miles per Hour



The Savannah
The First Steam Vessel to Cross the
Atlantic, 1819



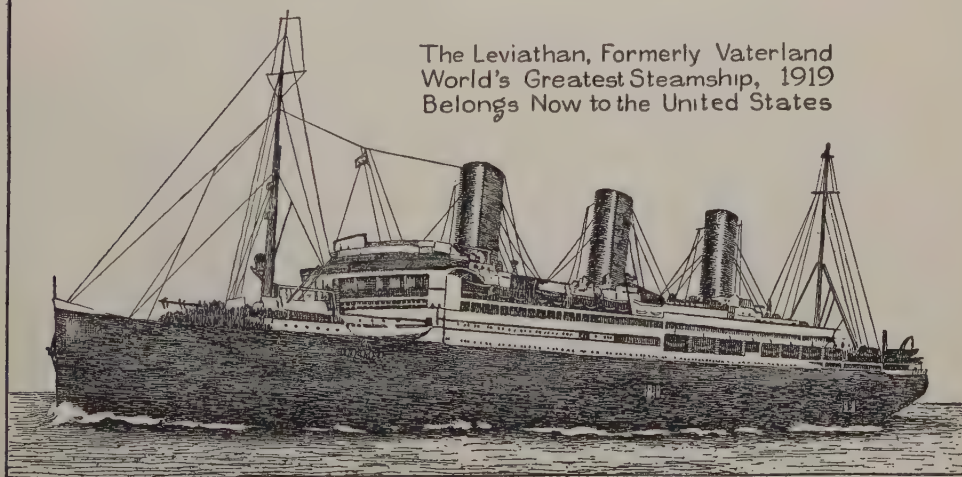
Mississippi River Steamer



Battleship, 30,000 tons



Ore Boat on Great Lakes, 1919. Capacity, 14,000 tons.



The Leviathan, Formerly Vaterland
World's Greatest Steamship, 1919
Belongs Now to the United States

afloat. Although these ships are larger than the *Mauretania*, they are not so swift.

The *Vaterland* was interned at New York at the outbreak of the World War. It was damaged by the crew to prevent its becoming of use to any other nation, but when the United States entered the war, the great ship was taken over by the government, repaired, rechristened the *Leviathan*, and placed in service under the American flag. It was invaluable in transporting troops to and from Europe.

Freight ships differ from passenger ships chiefly in being lower, and in having less powerful engines. A peculiar type of freight ship used on the Great Lakes for carrying ore, coal and grain is very low in the water and has a large carrying capacity. The hull is so constructed that the ship can be unloaded in a few hours by the use of mechanical devices.

Other Power Boats. Small boats propelled by gasoline engines are common as pleasure crafts on all small bodies of water. The success of these boats has led to the construction of small ships propelled by similar engines, and they are found to be economical for short voyages in transporting both freight and passengers.

Ships and the World War. Excepting the *Lusitania*, the names of ships destroyed by submarines or mines do not appear in the following list. According to the official report issued in London after the signing of the armistice, the total loss of merchant ships for the world on account of the war amounted to 15,053,378 tons; 2,475 British and 145 American ships were destroyed by submarines or mines. Among the neutral nations, Norway suffered most, losing 831 ships; Denmark lost 249; Sweden, 178.

In Great Britain and the United States new ships were built so rapidly that fully two-thirds of their losses were replaced by new ships, but the neutral countries were unable to replace the ships destroyed. At the close of the war the merchant marine of Great Britain held first place, and the United States had risen from an insignificant position to that of second place in both its navy and its merchant marine.

Notable Marine Disasters. The navigation of the seas from the earliest times has resulted in frequent disasters, involving serious losses of life. Many of these were due to acts of God, to storms or other cir-

cumstances beyond the control of men. A few were due to attacks by enemies, and others were caused by carelessness or negligence. Of the thousands of disasters which mark the history of navigation, only a few of the most noteworthy are listed below:

NAME OF SHIP	PLACE	DATE	CAUSE	DEAD
Association.....	Scilly Islands	Oct. 22, 1707	Wreck....	800
Prince George.....	Gibraltar	Apr. 13, 1758	Fire.....	400
Royal George.....	Spithead	Aug. 29, 1782	Wreck....	600
Queen Charlotte.....	Lezhorn	Mar. 17, 1800	Fire.....	673
St. George.....	Jutland Coast	Dec. 24, 1811	Wreck....	630
Defense.....	Jutland Coast	Dec. 24, 1811	Wreck....	600
Royal Adelaide.....	Margate	Mar. 30, 1850	Wreck....	400
Birkenhead.....	African Coast	Feb. 26, 1852	Wreck....	454
City of Glasgow.....	At Sea	Mar. 1854	Unknown..	450
Central America.....	At Sea	Sept. 12, 1857	Wreck....	400
Austria.....	Mid-Atlantic	Sept. 13, 1858	Fire.....	471
Lady Elgin.....	Lake Michigan	Sept. 8, 1860	Collision..	287
Captain.....	Off Finisterre	Sept. 7, 1870	Wreck....	472
Atlantic.....	Off Nova Scotia	Apr. 1, 1873	Wreck....	547
Cospatrick.....	Mid-Atlantic	Dec. 6, 1874	Fire.....	470
Princess Alice.....	Japan River	Sept. 3, 1878	Collision..	700
Ertogrul.....	Japan Coast	Sept. 19, 1890	Wreck....	540
Utopia.....	Gibraltar	Mar. 17, 1891	Collision..	574
Naronic.....	Atlantic	Feb. 1893	Unknown..	
Elbe.....	North Sea	Jan. 30, 1895	Collision..	335
Reina Regenta.....	Gibraltar	Mar. 11, 1895	Wreck....	400
Burgoyne.....	Off Sable Island	July 4, 1898	Collision..	871
Maine.....	Havana Harbor	Feb. 15, 1898	Explosion..	260
General Slocum.....	New York	June 15, 1904	Fire.....	1000
Norge.....	Scotch Coast	June 28, 1904	Wreck....	646
Mikasa.....	At Sea	Sept. 13, 1905	Explosion..	599
Mutsu Maru.....	Japanese Coast	Mar. 23, 1908	Collision..	300
Ying King.....	Near Hong Kong	July 28, 1908	Wreck....	300
Waratah.....	Atlantic	Aug. 1909	Unknown..	300
Titanic.....	Atlantic	Apr. 14, 1912	Iceberg..	1595
Empress of Ireland	St. Lawrence River	May 29, 1914	Collision..	1027
Bulwark.....	Thames River	Nov. 26, 1914	Explosion..	800
Lusitania.....	Irish Coast	May 7, 1915	Torpedo..	1446
Eastland.....	Chicago River	July 24, 1915	Capsized..	900

SHIRAZ, *she rahz'*, PERSIA, capital of the province of Farsistan, situated on a plateau about 4,750 feet above the sea in the southwestern part of the country, 112 miles from the Persian Gulf. It is in the midst of a region noted for its rose gardens, vineyards, cypress groves and orchards. The city is surrounded by an old wall, and one hundred years ago it was the residence of the ruler and was the chief center of science and art for Persia. It was then celebrated for its magnificent buildings and its elegant manufactures. It has now lost much of its importance and has been seriously damaged by earthquakes. The manufactures include textiles, rose water, glass, silverware and inlaid work. Population, estimated, 50,000.

SHITTIM, *shit'tim*, **WOOD**, the wood of which the ark of the Covenant in the wilderness was principally constructed. It is the wood of the shittah tree of the Bible, which is supposed to be the *Acacia seyal* of the Sinaitic peninsula. It grows to a height of twenty feet and has stiff, thorny branches. Its wood is of a hard, orange-brown color, and is well adapted to furniture making. It is not an imposing tree.

SHOD'DY, a fiber made of shredded woolen, worsted or mixed rags. The rags are thoroughly cleansed, then shredded and carded, by processes similar to those used in the manufacture of wool (See WOOLEN MANUFACTURE). When it leaves the cards the fiber is in the form of long, fluffy rolls. These are packed into bales under hydraulic pressure, and in this form they are shipped to manufacturers.

This used material is not so strong as new fiber, and in the reweaving a certain amount of new material is used with it; sometimes this is wool, sometimes cotton. In the form of wool powder shoddy is also used to add weight and substance to certain inferior woolen cloths. The shoddy industry is important in the United States, England and Canada. Where no attempt is made to deceive the buying public, the production of shoddy is a service to those of limited means, for it can be made into attractive and serviceable garments.

SHOES. See **BOOTS AND SHOES.**

SHOGUN, *sho'gun*, meaning *great general*, was the name given to the military commander of each of the four districts into which the Japanese Empire in early times was divided. These commanders eventually became absolute rulers of their districts and superseded the mikado in power. After having been held successively by four military clans for almost 700 years, the office of shogun was abolished by the revolution of 1868 and the central power was reestablished.

SHOOTING STAR. See **METEOR.**

SHORT BALLOT. In large cities at a general election the ballot usually contains so many names that many voters become confused in marking them, and not infrequently they vote for a candidate for whom they did not intend to vote. Moreover, the large number of officials to be elected makes it practically impossible for the voter to become acquainted with the qualifications of all the candidates, and irresponsible men are frequently elected to office.

The *short ballot* is designed to do away with these evils by placing on the ballot only the names of those officials who are to determine public policy, leaving to appointment all those whose duties are merely administrative. It is further urged that very few offices be filled at one election. Questions of public policy are also presented to the voter for his approval. Public interest in this pro-

posed reform is shown by the rapid extension of the commission form of government among cities, for this plan necessarily includes the underlying principles of the short ballot. See **MUNICIPAL GOVERNMENT.**



SHORTHAND, the method of writing by which the process is so abbreviated as to keep pace with speech. It is also known, according to the principle underlying the particular system, as stenography (compressed writing) and phonography (sound writing). It was practiced by the ancient Greeks and Romans, not only on account of its brevity, but for purposes of secrecy; but all knowledge of the art was lost from the tenth century until the end of the sixteenth, when modern shorthand had its birth in the publication by Dr. Timothy Bright of his *Characterie* and by Peter Bales of his *Arte of Brachygraphie*. In these early systems arbitrary signs were used in most cases to denote each word. The earliest system of shorthand of any practical importance was that of John Willis, whose *Arte of Stenographie* (1602) became very popular. It was based on the common alphabet, with the addition of arbitrary signs; and this, indeed, was the character of the numerous systems which obtained until the time of Pitman. Willis had many imitators, some of whom made slight improvements in his system, but William Mason, whose system was published in 1672, was the only one who made any real advance.

In 1751 Thomas Gurney published his *Brachygraphy*, founded on Mason's system, and the use of Gurney's system has been perpetuated by his descendants, who have been the official shorthand writers of the Houses of Parliament since the beginning of the nineteenth century. In 1767 appeared the *Universal English Shorthand* of John Byrom, an *a, b, c* system, characterized by "simple strokes and no arbitrary characters;" and in 1786 the *Stenography* of Samuel Taylor was published. This, which is the best of all the *a, b, c* systems, contributed largely to make stenography popular, and it was the system which was almost universally used until Isaac Pitman gave his *Phonography* to the world in 1837. Taylor's system possessed more easy

and natural outlines and was therefore capable of being written with a greater degree of speed than any previous system, and it contained no arbitrary characters. Harding, who re-edited the system in 1823, introduced a few.

Pitman had a number of predecessors, whose systems, like his own, were strictly phonetic. These systems, however, never obtained any footing, while Pitman's almost immediately became popular; the Benn Pitman system, a variation of the original Pitmanic, is now used by more reporters and shorthand writers than any other. Like all other phonetic systems, Pitman's rejects the ordinary orthography and writes words according to the sounds; thus *though* becomes *tho*, *plough* becomes *plow*, and *enough* becomes *enuf*. Discarding the common alphabet, which formed the basis of the stenographic systems, it has adopted an alphabet of its own, consisting of a series of straight lines, curves and dots, each representing a distinct sound. This alphabet is the basis of a highly ingenious and complex system, which aims at securing the greatest degree of brevity consistent with legibility. In rapid writing in Pitman's system the vowels are generally omitted.

In recent years several new systems have been introduced and have met with more or less success. Many of these are modifications of the original Pitmanic system, such as Graham's (1858) and Munson's (1867). There are also many constructed upon a new and so-called "rational" basis. Of these now widely used in the United States, the best-known are the Cross, or Eclectic, the Pernin, the Gregg and the McKee. All differ from each other as greatly as from the Pitmanic systems. The Cross, or Eclectic, is formed largely upon the basis of position of strokes, though several new strokes are also used. The Pernin is evolved from geometrical figures and does not use the Pitmanic shading. The Gregg system, which has been gaining adherents rapidly in the West, has five striking features—(1) no shading; (2) slope same as in long-hand; (3) no position writing; (4) vowels and consonants conjoined; (5) curves are used and few angles. The McKee, commonly known as the New Standard system, retains the Pitmanic shading, and its vowels are composed of circles and ellipses in different sizes. It does not use positions.

Shorthand has now been developed to the point where it easily keeps pace with speech,

a fair average for an accomplished reporter being from 150 to 175 words a minute. Speed records have been made and authenticated of from 200 to 275 words a minute, for a period of ten or fifteen minutes in succession, and higher rates have been reached for shorter periods.

SHOSHONE INDIANS, the great group of tribes who lived west of Kansas, north and west as far as Oregon and south and west to California. Those east of the Rocky Mountains were hunting tribes, of fierce and warlike disposition, while those living west of the mountains lived on small animals, fish, roots and seeds. The savagery of the Shoshoni, also called *Diggers*, or *Snake*, Indians, was thoroughly disgusting, but some of the southern members of the group, the Hopi in particular, living in Northwestern Arizona, were Pueblo Indians and were successful agriculturists and skilled makers of pottery and basketry. Bannock, Comanche, Ute and Shoshoni are among the principal tribes. The tribes belonging to this great family are bound together by kindred languages, more than by any physical resemblances or common customs of life.

Related Articles. Consult the following titles for additional information:

Comanche	Indians, American
Hopi	Ute

SHOSHONE FALLS, *sho sho'ne*, a waterfall of the Snake River, in Southern Idaho, exceeded in grandeur and majesty, in the United States, only by Niagara Falls and the falls of the Yosemite Valley. The river flows for some distance through a canyon 800 feet deep, where it has a number of small falls and cataracts. These terminate in the main fall, which plunges 190 feet into a lake at the bottom of a gorge over 1,000 feet deep.

SHOSHONE RIVER. See SNAKE RIVER.

SHOT, the name applied to small projectiles used in sporting weapons called *shot-guns*. It is made by pouring melted lead through holes in a collander placed at some distance above water. The drops of lead assume a globular form in their descent and harden when they strike the water. There are different sizes of shot, each adapted to the purpose for which it is intended. A small shot is used in hunting birds, but a large size is required for small animals. The sizes are designated by number.

Formerly the term *shot* was applied to all solid projectiles fired from cannon, but it is

not considered in that sense since the invention of the modern shell. See SHELL.

SHOT, PUTTING THE, an athletic test of strength and skill. The shot putter throws a weight the greatest distance possible without stepping outside of a seven-foot circle. The shot is spherical in shape. For the use of boys it weighs twelve pounds; for adults, sixteen pounds. In the first position the putter stands with his right heel just within the circle and his left foot forward. The put is held loosely in his right hand, which rests, palm upward, on his right shoulder, and the right elbow is held close to the body. The first movement is a leap forward by a quick turn to the right, which brings the weight of the body upon the right foot. The putter then swings his body forward, using his left foot as a pivot, throwing his right foot forward as far as he may, at the same time thrusting out his right arm and releasing the shot at an angle of forty-five degrees. Shot putting is not arm throwing, but, rather, delivering a weight by swinging the entire force of the body into the movement.

SHOTGUN, a smooth-bore gun which fires a charge of small shot, and which is used for shooting small game. Formerly shotguns were made with one, two or even three barrels, and the double-barrel gun is still in favor with many sportsmen. The typical modern shotgun has but one barrel, and a magazine in which the shells are stored. The bore of a shotgun is named from the weight of the bullet, required to fit it. If it takes a bullet weighing one-twelfth of a pound, it is a 12-bore. This and 10-bore are the sizes most commonly used. All modern shotguns are breechloaders, the cartridges or shells being inserted in the breech. The cartridge—a charge of explosive, a load of shot and a percussion cap, to explode the charge—is usually packed in a cylindrical paper casing. From six to twelve cartridges can be placed in a magazine. The effective range of a 12-bore shotgun is from sixty to seventy-five yards; for rabbits and partridges, forty to fifty yards.

The first breech-loading gun was invented in 1836, and since that time by numerous improvements shotguns have been brought to as high degree of perfection as any other small arm. Hammerless guns, which discharge the shell by a mechanism hidden in the breech, are the most popular. The prices of shotguns vary from \$10 for the cheapest to \$200.

SHOVELBOARD. See SHUFFLEBOARD.

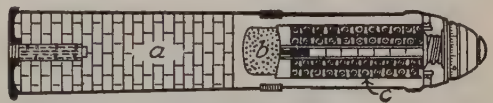
SHOVELER, *shuv'el er*, or **SPOON'BILL**, a river duck, so named because the end of its bill is widened, like a shovel or spoon, its upper mandible overlapping the lower. It



SHOVELER

feeds in the mud of shallow waters, using its bill to stir up the mud and capture small animals. The male bird is rather gay in color, but the female is much more modest in appearance. One species is found in the United States during summer, although the shoveler is more prevalent in South America, South Africa and the Australian region.

SHRAPNEL, a projectile used extensively by field artillery and to some extent in navies. It consists of an elongated pointed steel shell filled with bullets and an explosive charge set to a time piece. The base of the shell is enclosed in a metal case which contains the explosive that fires the shell from the gun. There are a number of sizes of shrapnel, each determined by the caliber of the gun in which it is to be used. The 3-inch gun is in general use in light field artillery, and this carries a shell weighing about eighteen pounds. The length of the shell is three times its diameter



SHRAPNEL

- a. Smokeless powder (Nitrocellulose)
- b. Black powder
- c. Shot

and it carries from 238 to 350 lead balls. The exploding charge may be placed in the front or the rear. A shell for 5-inch gun weighs forty-five pounds, and contains 22½ pounds of lead balls. These shells are effective at 11,000 yards, or about six miles. Those of the 3-inch gun are effective from three to four miles.

Shrapnel is designed for use in the field and to dislodge the enemy from covered places, and is very destructive. A single shell when it bursts throws its balls over an area of several hundred square feet. A battery of a few guns will soon render a large field untenable. In the navy shrapnel is used against torpedo boats and other small craft. It was named for its inventor, Colonel Henry Shrapnel of the British army.

SHREVEPORT, *shreev'port*, LA., the second city in size in the state and the parish seat of Caddo Parish, 325 miles northwest of New Orleans and fifteen miles from the Texas state line. The city is on the Red River and on the Texas & Pacific, the Missouri, Kansas & Texas, the Vicksburg, Shreveport & Pacific, the Houston East & West Texas, the Kansas City Southern, the Louisiana Railway & Navigation Company, the Louisiana & Arkansas, the Saint Louis & Southwestern (Cotton Belt) and the Texarkana, Natchitoches & Shreveport railroads. It is in the center of the northwestern part of the state. Cotton is the principal product of the rich agricultural region, and the city contains cotton compresses, cottonseed oil mills, machine shops, fertilizer works, ice factories, lumber and stockyards and manufactories of safes and vaults, silos and bottles. It also exports considerable live stock, hides and wool. Some of the prominent features are three hospitals, a Federal building, a courthouse, a fine city hall, a large hotel and a new bank building. Shreveport was settled in 1833 and was incorporated in 1839. During the Civil War it was the capital of the state, after the capture of Baton Rouge. The commission form of government was adopted in 1910. Population, 1910, 28,015; in 1920, 43,874, a gain of 57 per cent.

SHREW, a genus of small insect-eating mammals, found in almost every region of the northern hemisphere. The *common shrew* may readily be distinguished by its prolonged muzzle, by its teeth, colored brown at the tips, and by its reddish-brown fur. It feeds chiefly by night upon insects and their larvae, and inhabits dry places making a nest of leaves and grasses. Shrews are voracious in their habits and frequently kill and devour one another. They secrete a fluid of disagreeable odor, which prevents larger animals from eating their flesh. In former days the bite of the shrew was accounted venomous, while its body, variously treated, was regarded

as a cure for many complaints. One American species, the *mole shrew*, resembling a mole in some of its habits, feeds upon flesh of all kinds. Another American species is the *shrew mouse*, smaller and lighter in color, which dwells around marshes and wet regions.



COMMON SHREW

The *water shrew*, the largest American shrew, attains a total length of about five inches. The snout is not so pointed as that of the common shrew. Its color is black on the upper parts and white underneath. A prominent swimming fringe of stiff, white hairs is found on the tail and the toes, which forms a distinctive feature of the species. Its food resembles that of the common shrew. It makes its burrows in the overhanging banks of rivers and lakes and dives and swims with great facility.

SHREW MOLE, a genus of mammals belonging to the family of shrew mice, but also by some zoölogists placed in the mole family. It is found in North America, usually near rivers and streams, and burrows after the fashion of the common mole, which it resembles in its fine and closely-set fur. The average length of the shrew mole is about seven inches.

SHRIKE, a name applied rather loosely to various birds with strong, hooked bills. In the United States but two species are



SHRIKE

found—the *northern shrike*, or *butcher bird*, and the *loggerhead shrike*. These birds strongly resemble each other in appearance

and differ but little in size. Their general color is gray on the upper and white on the under parts, the quills of the tail are black, and a black band crosses the forehead and surrounds the eyes. Shrikes are about nine or ten inches in length. They prey on large insects and small mammals, impaling them upon thorns, fence barbs, or forked twigs.

SHRIMP, a genus of small crustaceans, closely allied to the crawfish. The *common shrimp*, found in the North Atlantic on both



SHRIMP

the European and American coasts, and in the Pacific, is about two inches long, greenish-gray in color, with brown dots; on the Pacific coast it is pink. Shrimps are caught in nets and are marketed in canned form.

SHROVE TUESDAY, in Roman Catholic ritual, the day before the first day of Lent, or Ash Wednesday, so called because confession is specially made and "shrift" is received. It was at first a day of considerable festivity, and from the common practice in England of eating pancakes then, the day came to be called *Pancake Tuesday*. It is the *Carnival* of the Italians. Since 1857 Shrove Tuesday has been celebrated in New Orleans by a street pageant, known as the *Mardi Gras* representing, in elaborate tableaux, noted scenes in history and literature, by a masquerade ball and by other gay entertainments.

SHUFFLEBOARD or **SHOVELBOARD**, a game played by two or four persons, on a sand-sprinkled board, thirty feet long, with raised edges. Across the board, five inches from each end, a line is drawn. Eight circular pieces of iron, about two and a half inches in diameter and weighing a pound, are used by the players, who slide them the length of the board. Each side has four pieces, and the players slide them in rotation. If a piece is left projecting over the edge of the board, it scores three points. If it rests between the finishing line and the edge or on the line it scores two points. If no piece is inside the line, then the one nearest to it scores one. The game is twenty-one points.

Another form of shuffleboard is popular on ocean steamers. A place on the deck is marked out, as in the accompanying diagram. The players stand nine or ten paces away, and each in turn pushes one of his pieces along the deck with a crutch-shaped cue, in an endeavor to leave the pieces on the numbered squares. If a piece rests on one of

	-10	
6	1	8
7	5	3
2	9	4
	-10	

SHUFFLEBOARD

the semi-circular places, ten is taken off the player's score; on the squares the count is as indicated by the numbers. The game is exactly 50 points. If more than fifty are made, the additional ones are deducted from the score.



A Siamese prince

SIAM, the "Kingdom of the Free" and the "Land of the White Elephant," is the only independent country in Indo-China Peninsula. A projection extends into the Malay Peninsula, reaching south to the 4th degree of north latitude, and is known as Lower Siam. Siam proper is bounded on the north and east by Anam, or French Indo-China, on the south by the Gulf of Siam and on the west by Burma. Lower Siam separates the Indian Ocean on the west from

the China Sea on the east. The northern boundary is somewhat indefinite, but the area of the country is about 195,000 square miles, or about the area of California and Indiana combined. About 45,000 square miles are in the Malay Peninsula.

The People. In 1922 there were over 9,000,000 people in the country. Of these, 1,500,000 were Siamese, who are indolent, carefree, submissive and hospitable. They are of Mongolian stock, of medium height, and have an olive complexion, somewhat fairer than that of the Malay. Many Laotians dwell in the northern part of the kingdom, and Shan, Karen and Kamoo tribes are found in the uplands. The country contains a large number of Chinese, who control all the im-

portant business enterprises. It is estimated that one-third of the population of Bangkok is Chinese.

Buddhism is the principal religion, and the white elephant, which is native in the peninsula, is an object of veneration and even worship, because it is believed that the soul of some great king or of Buddha himself is embodied in the animal. Buddhism is found in Siam in its purest form, and the king is recognized as the protector of the faith. Class distinctions, such as are found in India, do not exist.

All public schools are under control of the Minister of Public Instruction and Ecclesiastical Affairs. There is a commissioner of education in each province. Besides government schools there are local and private schools, and in addition to the activities of the government in behalf of education, the institutions established by American, English and French missionaries provide educational facilities for a large number of children. A number of secondary schools have been established, and a university with departments of medicine, law, engineering, agriculture, commerce and pedagogy has been organized. The Siamese language is the official language of the kingdom.

Surface and Drainage. In general, Siam proper is a low plain, sloping gently toward the south and consisting of the valleys of the Menam River and its tributaries, together with the Mekong, which forms the western boundary, and the valleys of its tributaries. The watersheds between these are low and in some places scarcely noticeable. In the main, the land along the streams and near the coast is low and swampy. On the southeastern border is Tonle Sap Lake, a large part of which is in Cambodia. On the western boundary is a rocky ridge, constituting a low mountain chain, the extension of which forms the backbone of the Malay Peninsula. The Mekong, forming a part of the eastern boundary; the Menam with its tributary, the Meping, and the Nam Mun are the principal rivers.

Climate. The climate is tropical, but owing to the position of the country in reference to the sea, it is not as hot as one might expect from the latitude. The humidity is great, and in general the climate is trying, if not unhealthful, to Europeans. There are two seasons, the wet and the dry, the former lasting from May to October, and the latter occupying the remainder of the year. The rain-

fall is heavy, in some sections amounting to 240 inches a year, but during the dry season, in the northern part of the country, no rain falls for several months. Here the atmosphere is drier, and the nights are cool.

Production and Industry. The northern part of the country is covered with dense forests, containing teak and other tropical woods, and large quantities of teak are exported, but the great wealth of the country lies in its agricultural regions, which are confined to the lowlands of the southern half. By means of the numerous rivers and canals, these can be amply watered and even flooded when necessary. The chief crop is rice, and Siam is one of the largest producers of this grain in the world. Cotton, tobacco, sugar cane, coffee and pepper are also raised. The mineral resources are not developed, yet mining is carried on to a considerable extent. The mining operations include tin, gold and tungsten. Coal, iron, zinc, manganese and antimony occur in large quantities.

Transportation and Commerce. The rivers constitute the chief avenues of commerce. There are over 1,200 miles of railway in operation. The telegraph and the telephone have also been introduced. The chief export is rice, and the annual shipments vary in value from \$15,000,000 to \$20,000,000. Other important articles of export are teak and precious stones. The timber cutting is under the care of English experts, who have supervision of the forests.

Government. The government is an absolute monarchy. The king is assisted by a ministry, consisting of members appointed by himself, who have charge of the various departments of government. In addition to these there is a legislative council which includes the ministry, ex-ministers and others who are nominated by the king. Within recent years the government has made marked advance along lines similar to those followed by the best European nations. This is largely due to the advice of foreigners, especially Englishmen, whom the king has called to his assistance. For the purpose of local government the country is divided into provinces, over each of which is a governor. Much of the territory subject to the king is nominally under the control of France or Great Britain, and other portions are ruled by the chiefs of native tribes, though these are subject to the central government at Bangkok. The Malay provinces are ruled by rajahs, who

are subject to a local agent, who represents the king. Bangkok is the capital and the only city of importance. Consult Knox's *Siam and Java* and Annie H. Leonowen's *Siam and the Siamese*.



SIBERIA, *si bé'ria*, formerly a division of the Russian Empire, constituting the most extensive portion of the Russian domain in Asia. In 1917, when the czar was overthrown, a provisional government was set up in Siberia independent of the one in Petrograd, and later, on the seizure of power by the Bolsheviks, an anti-Bolshevik government was established at Omsk, in Western Siberia. (For details, see subhead *History*, below.)

Physical Features. Siberia extends across the continent of Asia, from the Ural Mountains on the west to the Pacific Ocean on the east, and from China on the south to the Arctic Ocean on the north. The southern boundary is distinctly marked along the western portion by the Thian-Shan Mountains; by the Altai, in the center, and by the Yablonoi, farther east, while the extreme eastern portion of this boundary is formed by the Amur River. The area is about 4,800,000 square miles, or one and one-half times that of the United States, exclusive of Alaska and island possessions.

The entire region is a vast plain, sloping gradually to the north, but it is naturally divided into western and eastern portions, the western part containing scarcely any elevations, the watershed between the Obi and the Yenesei being so slight that it is scarcely perceptible. The Stanovoi Mountains extend along the eastern coast and rise abruptly from the sea. A spur of this range, extending into the peninsula of Kamchatka, has some peaks that are estimated to have an elevation of nearly 15,000 feet. Between the Stanovoi Mountains and the Lena River are a number of broad elevations, more resembling plateaus than mountain ranges, so that this portion of Siberia has a somewhat mountainous character. The highest peaks are found along the southern border, where the White Mountain, in the great Altai, near the southeastern

boundary, reaches an elevation of 14,800 feet, and other elevations along the ridges forming this boundary, range from 9,000 to 12,000 feet.

Siberia has a number of long rivers. In their order, from the west eastward, these are the Obi, the Yenesei and the Lena, flowing into the Arctic, and the Amur, flowing into the Pacific. It is estimated that no other country, except Brazil, has so many long rivers as Siberia. The Amur is navigable for about 2,400 miles; but the rivers flowing into the Arctic are of little value commercially, because they are closed by ice during the greater portion of the year. However, steamers ascend these and their tributaries during the summer months and afford the inhabitants of their valleys opportunity to communicate with the outside world.

Climate. The climate of Siberia is characterized by short, warm summers and long and intensely severe winters. Central Siberia is considered to have a colder climate than any other habitable portion of the globe, the thermometer in winter sometimes registering 60° and even 75° below zero. In the northeastern part of the country, the soil remains frozen throughout the year, with the exception of a few inches near the surface, that thaw during the summer. It is supposed to be frozen for several hundred feet below the surface. In excavations that have been made, layers of ice intervening between layers of soil have been found to considerable depths, and geologists are of the opinion that these ice sheets are remains of the glacial age. In the eastern part of the country there is very little rain or snow, and over a good part of the region, it is impossible to use sledges; but in the western portion there is rainfall sufficient for successful agriculture.

Resources and Industry. According to its vegetable life, Siberia can be divided into three regions. The great tundra, occupying the northern portion of the country, has its surface covered with mosses and lichens, except during the short summer, when numerous flowering plants spring up and come to rapid maturity. South of this, occupying the central portion, is the wooded belt, which extends the entire length of the country and contains trees of stunted growth. This gradually merges into the woodland and forest belt, which extends across the entire southern part. This region is believed to contain the most extensive forests known, aside from those of

the Amazon basin. Here are found large areas of pine, spruce, maple, oak, beech, birch and poplar. The summers in this part of Siberia are sufficiently long to admit of the growing of nearly all crops raised in cool temperate regions. Siberia abounds in fur-bearing animals, and the taking and curing of furs is a valuable industry for the inhabitants of some of the colder regions.

The mineral wealth is largely undeveloped. Mining operations are carried on in the Ural Mountains, where gold, silver and platinum are found. Gold mines are also worked to some extent in the eastern and northeastern parts of Siberia, and coal mining has received some attention. There are extensive deposits of salt, sulphur, lead and copper awaiting development.

Agriculture is the chief occupation of the inhabitants, and this is most extensive in western Siberia, where large crops of wheat, hay, oats, barley and potatoes are raised. The raising of live stock is also important. The most important manufacturing center is Tomsk, which contains a number of mills and factories and supplies a large region with porcelain, flour, carpets, iron ware and refined sugar.

Transportation. The Trans-Siberian Railroad, extending the entire length of Siberia and connecting Vladivostok, on the Pacific, with Moscow and Petrograd, has been an important factor in the development of the country. By means of this line of transportation, goods from other lands can be imported, and the products of the inhabitants can reach foreign markets at rates of transportation that enable them to be sold with a margin of profit. Because of unsettled conditions this railroad declined considerably in efficiency after the Russian revolution, but steps were taken in the spring of 1919 to rehabilitate it. In March allied control of the road was effected by the formal organization of technical and military committees. The head of the technical committee was John F. Stevens, an American railway expert.

People. Western Siberia is much more densely populated than the other portions of the country. Over sixty per cent of the population are Russians. The other inhabitants include, chiefly, Germans and Aryan gypsies, while in the eastern portion are a number of tribes closely allied to the Samoyeds and Finns. In Eastern Siberia are Tartars, Chinese, Manchus and Koreans. In 1915 the

population was estimated at 10,377,900.

Cities. Under the old régime, Omsk (population 135,800) was the seat of government of the Steppes provinces, but it is geographically in Siberia. Irkutsk (129,700) was the capital of Eastern Siberia; Tomsk (116,664), the capital of Western Siberia. The largest Pacific port, Vladivostok (91,464), was the chief Russian naval station in Asia.

History. Western Siberia was taken by the Russians in 1582, and from that time the purpose of the Russian government was to extend its dominions eastward. It was a long time before the Pacific coast was reached, and the last acquisition of territory, which was obtained from China, was not made until 1861. Following the Chino-Japanese War, in 1896, Russia secured a lease of Port Arthur and other portions of Manchuria, but its failure to keep the treaty agreement to vacate certain ports after 1900 led to the war with Japan in 1904, as a result of which Russian aggressions in the East were checked, and Port Arthur, a part of the island of Sakhalin and some other territory were relinquished.

Under the rule of the czars thousands of political offenders were sent to Siberia, and the name became synonymous with cruelty and despotism. There is no doubt that great injustice characterized the system, and many of the exiles who returned to Russia in 1917 on the downfall of the imperial government, had strongest personal reasons for throwing themselves into the revolutionary movement. The people of Siberia attempted to establish an independent republic at that time, and the Siberian district congress at Tomsk elected a provisional government with a coalition Cabinet.

The overthrow of the Kerensky régime by the Lenine group in November, 1917, gave impetus to Bolshevik sentiment in Siberia, and from that time on there was great political confusion. The situation was affected by several factors, including the march of the Czecho-Slovaks through Siberia and the landing of allied troops to keep the country from falling into anarchy. The Czecho-Slovaks, men of Bohemia and Slovakia, were deserters from the Austrian army. Several thousand had joined the Russians, and when Russia withdrew from the war they were given permission by Lenine to go to France by way of Siberia. While on the march they were attacked by Bolsheviks, and, according to re-

ports, by liberated German and Austrian prisoners. In self-defense they struck back, seized the Trans-Siberian Railway, and were persuaded by the allies to remain in Siberia to help preserve order.

Omsk became the headquarters of the anti-Bolshevik government, and in the fall of 1918 there was established in that city a directorate of the All-Russian Government, representing a coalition of numerous political and social parties. In November Admiral Kolchak, head of the anti-Bolshevik troops in Siberia, was made leader of the government. In the meantime the allies had intervened by sending troops into the country, with the understanding that they were to work under the leadership of Japan, and that each country was to land not more than 7,000 men. The object of intervention was to preserve order and aid in the economic development of the country. The American contingent was commanded by Major-General S. Graves, and the first disembarkation, at Vladivostok, occurred on August 15, 1918. Much criticism was directed against the United States government because of its supposed "do nothing" policy. President Wilson publicly declared that America would not intervene in the domestic affairs of the Russians, and the American officials scrupulously followed this policy, so far as it was possible.

America did take steps, however, to prevent the exploitation of Siberia by Japan. Because of representations made by the State Department Japan withdrew over half its troops from the country, as the Japanese government had sent about ten times as many soldiers as had been agreed upon. America also succeeded in bringing about an inter-allied agreement for the reorganization and operation of the Trans-Siberian Railway, a move which had long been hindered by the Japanese war faction. By March, 1919, American troops had begun to take control of strategic points on the railway between Vladivostok and Tchita, and the system was being reorganized.

The political and military situation was somewhat uncertain in the summer of 1919. For a time Admiral Kolchak had considerable success against the Russian Bolsheviks, but lacking support and supplies he was finally compelled to yield to the greater strength of the bolshevist army. American and Japanese forces soon withdrew from the country, and Siberia became an integral part of the Socialist Soviet Republic of Russia. As or-

ganized by the Soviet government, Siberia has a territory of 4,863,160 square miles, and a population of over 11,000,000.

Related Articles. Consult the following titles for additional information:

	CITIES
Irkutsk	Tobolsk
Omsk	Vladivostok
	LAKES
Aral	Baikal
	MOUNTAINS
Altai	Ural
Stanovoi	Yablonoi
	RIVERS
Amur	Obi
Lena	Yenesel
	UNCLASSIFIED
Russia	World War
Trans-Siberian Rail- way	

SIBYL, *sib'il*, according to Greek and Roman mythology, a group of women said to have been endowed by Apollo with prophetic spirit. Their number is generally given as ten, of whom the most celebrated was the *Cumaeen sibyl* (from Cumae, in Campania). She was said to have written the collection of prophecies known as *Sibylline Books*, which she offered to Tarquin the Proud for sale. When he refused to buy them, on account of their excessive price, she threw three of the nine books into the fire. On a second refusal, she destroyed three more, after which Tarquin, in alarm, paid for the three remaining volumes the price originally asked for the nine. These books were preserved in the Temple of Jupiter Capitolinus, and were consulted on occasions of national danger. When, in 83 B. C., they were burned in a fire which destroyed the temple, the Senate sent delegates to Italian and Greek cities to collect all Sibylline verses they could find. About 1,000 were retained and preserved in the new Temple of Jupiter Capitolinus. These were burned by Stilicho shortly after A. D. 400. The so-called Sibylline oracles which have come down to modern times are of Jewish or Christian origin, dating from about 170 B. C. to A. D. 700.

SICILIAN, *sis sil'e an*, **VES'PERS**, the name given to the massacre of the French in Sicily on Easter Monday, 1282, while the bells were ringing for the vesper service. Charles of Anjou had established himself, through the favor of the Pope, in possession of Naples and Sicily. He ruled with great severity, and the oppressed people applied in vain to the Pope for relief. Enraged by the insult offered a young bride by a French soldier, the inhabitants of Palermo flew to

arms and massacred the French. Messina and other towns followed the example of Palermo, and the Sicilian Vespers ended in the overthrow of the domination of Charles of Anjou.

SICILIES, *sis'il liz*, KINGDOM OF THE TWO, a former kingdom of Italy, consisting of Naples, or southern Italy, and Sicily (see SICILY). About 1037, while Greeks and Saracens were struggling for the possession of Lower Italy and Sicily, the sons of Tancred de Hauteville, a count in Lower Normandy, entered Lower Italy with their followers. Robert Guiscard, one of these brothers, subdued Apulia and Calabria, taking the title of duke, and his youngest brother, Count Roger, conquered Sicily. Roger's son and successor, Roger II, completed the conquest of all Lower Italy by subduing Capua, Amalfi and Naples, and in 1130 he took the title of king, calling his kingdom the Kingdom of the Two Sicilies.

In 1189 the race of Tancred became extinct, and the German emperor, Henry VI, of the House of Hohenstaufen, claimed the kingdom in the right of his wife, the daughter of Roger II. The kingdom remained with the family of Hohenstaufen until 1266, when Pope Urban IV, feudal overlord, bestowed it upon Charles of Anjou, brother of Louis IX of France.

In 1282, Sicily freed herself from the oppressions of the French (see SICILIAN VESPER) by the aid of King Pedro of Aragon, and Naples was separated from it, Sicily being subject to the kings of Aragon. Naples remained under the rule of the House of Anjou. Alfonso V of Aragon gained possession of Naples in 1442, which he bestowed on his natural son, Ferdinand.

In 1504 Sicily was united to Naples under the Spanish crown, but in 1713 the Peace of Utrecht again divided the Two Sicilies, Naples falling to Austria, Sicily to Savoy. Philip V of Spain reconquered Sicily, but was forced to cede it to Austria in 1720, Savoy receiving Sardinia in exchange, by which means the Two Sicilies became a part of the Austrian dominions.

In 1734 Don Carlos, son of Philip V, invaded Naples, conquered both the continental and the insular part of the kingdom and was crowned at Palermo in 1735 as Charles IV. This change was sanctioned by the Treaty of Vienna (1738), and till 1860 this line of the Bourbon family maintained possession of the Two Sicilies, except for a few years during the Napoleonic period, when Joseph Bona-

parte and Joachim Murat reigned on the mainland as kings of Naples.

Francis I, Ferdinand II, and Francis II were despotic tyrants, who forced the people into periodic revolts, which were put down with much severity. In 1860, however, an insurrection broke out in Sicily, and an expedition of volunteers from Piedmont and other Italian provinces, under Garibaldi, sailed from Genoa to the assistance of the insurgents. The result was that the Neapolitan troops were driven from the island. Garibaldi, following up his success, crossed over to the mainland, where he met little or no opposition. Francis II fled from Naples; the strong places in his hands were reduced, and by a popular vote the Kingdom of the Two Sicilies ceased to exist as such, and became a part of the kingdom of Italy. See ITALY, subhead *History*.

SICILY, *sis'il i*, a mountainous island, the largest in the Mediterranean, belonging to Italy, from the southwestern extremity of which it is separated by the narrow Strait of Messina. It has an area of about 9,935 square miles. The north and east coasts are steep and cliffy and are provided with good harbors, the finest being that of Palermo. The greater part of the surface consists of a plateau of varying elevation, and the highest point is the active volcano of Etna, in the eastern part of the island.

Climate. The climate, as in the other regions of the Mediterranean, is mild and agreeable, except when the island is visited by the sirocco. The soil is very fertile.

Industries and Manufactures. Three-fourths of the cultivated surface is given over to cereals, chiefly wheat, although oats and barley are also grown. Cotton, sugar and tobacco are also cultivated to some extent. Fruits of every variety grow in abundance. The vine flourishes almost everywhere, and much wine is produced. The chief exports are fruits, wine, sulphur, olive oil and sumach. Tunny and sardine fisheries are carried on along the coast. Manufactures are but little developed. The chief seats of foreign commerce are the three principal towns, Palermo, Messina and Catania. The system of roads and railways is defective. Education is extremely backward. Life and property are by no means secure, and brigandage still exists.

History. At the dawn of history, the older races inhabiting Sicily, the Sicani and the Siculi, were hemmed in by Phoenician and

Greek colonies. The Greeks, who entered the island in the eighth century B. C., founded the great cities of Syracuse, Agrigentum and Messina. They drove the Phoenicians to the northwest coast and spread their influence and culture over the whole island. Greek art and literature flourished, and many Greek names of distinction are connected with Sicily. The Carthaginians later took the place of their kinsmen, the Phoenicians, and between them and the Greeks a struggle ensued, which ended in favor of the latter (480 B. C.).

War with the Carthaginians brought the Romans to Sicily, and the island became a Roman province in 212 B. C. On the decline of the Roman Empire, the island was overrun by the Goths, who retained possession till the sixth century A. D., when Sicily became part of the Byzantine Empire. In the beginning of the ninth century, the Saracens gained control and continued their supremacy until their expulsion in the eleventh century by the Normans, who remained long enough in possession to establish the feudal system in all its rigor. (For a continuation of the history of Sicily, see SICILIES, KINGDOM OF THE TWO.) Population, 1921 census, 4,132,156.

SICK'LE, a reaping hook, consisting of a curved blade of steel with a handle, the edge of the blade being in the hollow of the curve. In using the sickle, the workman holds the handle in the right hand and grasps with the left hand as much grain as can be cut at one stroke. The sickle is then placed around this bunch of grass, just below where it is held, and is drawn backward towards the handle. The sickle has been largely superseded by the cradle, and the cradle in turn has given place to reaping machines. See SCYTHE.

SIDDONS, *sid'unz*, SARAH KEMBLE (1755-1831), the most celebrated English actress of her time, the daughter of Roger Kemble. She was born at Brecon, Wales. After her first success at Cheltenham, in *Venice Preserved*, in 1774, she secured an engagement at Drury Lane Theater, London, which was almost a failure, and again went on a circuit in the provinces. On her second appearance at Drury Lane, in 1782, as Isabella in *The Fatal Marriage*, she was acknowledged to be the foremost tragic actress of the English stage, and this distinction she retained until her retirement in 1818. She captivated audiences as Queen Catherine in *Henry VIII*, Lady Macbeth, Volumnia in *Coriolanus*, and many other parts. Sir Joshua Reynolds

painted a celebrated picture of her as the "Tragic Muse."

SIDEREAL, *si dé're al*, **TIME**, time measured by the apparent motion of the stars. A *sidereal day* is the time from the passage of a star across the meridian till its next passage; it is exactly the period of the revolution of the earth on its axis. It is the most constant unit of time. Its length is 23 hours, 56 minutes, 4.098 seconds. A *sidereal year* is the period in which the fixed stars apparently complete a revolution and come to the same point in the heavens; it is the exact period of the revolution of the earth around the sun. There are 366.2563612 sidereal days in a sidereal year.

SIDNEY, PHILIP, Sir (1554-1586), an English soldier, courtier and poet, one of the most conspicuous figures at the court of Queen Elizabeth. After graduating at Oxford, he traveled through Europe, and on his return he was most cordially received by Queen Elizabeth. During an absence from court, forced upon him by his outspoken opposition to a projected marriage of the queen, he wrote his famous romance of *Arcadia*. It is said that at one time, when, with Sir Francis Drake, he planned to set out on an expedition to the West Indies, Elizabeth commanded him to remain in England, saying that she could not lose the "jewel of her kingdom." Sidney had a part in England's attempt to defend the Dutch against the Spaniards, and at the Battle of Zutphen he was mortally wounded. While he was being carried from the battlefield, he called for water, but when it was brought to him, he motioned it away and said to a wounded soldier whom he saw regarding him wistfully, "Thy need is greater than mine." Sidney's death was deeply mourned throughout England. Though his writings have much merit, it is chiefly as a perfect type of the English gentleman that he is remembered.

SIDON, *si'dun*, one of the leading cities of ancient Phoenicia, situated on the Mediterranean, twenty-five miles south of Beirut. At various times it alternated with Tyre in supremacy in the Phoenician confederacy.

Sidon was famed for its purple dyes. Its people were skilled traders and artisans. Pliny credits them with the discovery and manufacture of a glass from the fine sand of the Belus River. A number of magnificent sarcophagi have been found in the vicinity of Sidon. The modern town of Saida, with a

population of about 12,000, occupies a portion of the site of the ancient city. See PHOENICIA; TYRE.

SIEGE, *seej*, in war, the stationing of an army before a fortified place for the purpose of forcing its surrender. In conducting a siege the enemy is first surrounded and cut off from supplies, reinforcements and retreat. The attacking party intrenches itself completely around and outside the land works of the defender and patrols the water front, if the fortification is situated on the water. A prolonged siege may starve the defender into submission, but the possibility of a relieving force causes the siege in many cases to end in an assault. Tunneling under walls and blowing them up with mines, bombardment by artillery fire, every engineering device known, may be applied in the conduct of a siege. In the latest warfare, bombardment along an extended line is a more common form of siege than the surrounding of a fort.

There have been many famous sieges in history, marked by heroic resistance of garrisons and inspiring bravery of assailants. Such are the fourteen months' siege of La Rochelle by Cardinal Richelieu in 1628; the four years' siege of the rock of Gibraltar by the French and Spanish during the years 1779-1783, and the siege of Port Arthur by the Japanese in 1904. In the World War there were sieges at Namur, Maubeuge, Novo Georgievsk and Przemyśl, while the campaigns on the various fronts, in which the armies of both sides intrenched themselves for months at a time, took on many of the characteristics of gigantic, prolonged sieges. See BOMBARDMENT; FORTIFICATION.

SIENKIEWICZ, *shen kya'vich*, HENRYK (1846-1916), a Polish author of a number of historical novels of tense dramatic interest, notably *Quo Vadis*, which has been given repeated stage as well as film rendition. He was born in the province of Siedlee, and was educated at the University of Warsaw. His first publication was a humorous story, *Nobody is a Prophet in His Own Country*. He wrote descriptions of a visit to California, a drama, and a number of short stories before the publication, in 1880, of a novel, *The Tatar Bondage*. The powerful historical trilogy, *With Fire and Sword*, *The Deluge* and *Pan Michael*, paved the way for his greater success, *Quo Vadis*, published in 1895. Notable among his other novels are *Without Dogma*, *The Children of the Soil*, *Knights of*

the Cross and *In Desert and Woodland*. In 1905 he was awarded the Nobel prize for literature. The translation of his works have given him an extended, appreciative audience in all countries. Sienkiewicz died in Switzerland while on a relief mission in behalf of his country, rendered prostrate in the World War.

SIERRA LEONE, *la ohn'*, a British colony and protectorate on the west coast of Africa. The colony embraces a narrow coastal strip varying in width from eight to twenty miles and extending from French Guinea, on the north, to the Mano River on the south. It was founded in 1791 by a group of English philanthropists as a refuge for negro slaves. It has a population of about 75,000. The Sierra Leone Protectorate, embracing an area of about 30,000 square miles, lies to the east of the colony. It has a population of 1,403,000, consisting chiefly of negro tribes.

Near the coast the surface is flat and rocky; in the interior it is hilly, some elevations attaining a height of from 2,000 to 3,000 feet. The country is watered by a number of streams, flowing to the Atlantic. The climate is exceedingly hot and unhealthful, especially along the coast. The soil is fertile, the rainfall heavy, and abundant crops of rice, corn, plantains, yams, cassava and pumpkins are raised. Sugar cane, coffee, ginger, indigo and cotton can also be grown with profit. Tropical fruits are native, and bananas, pineapples, oranges and pomegranates are found in abundance. Some parts of the colony are covered with dense forests containing teak, ebony and rosewood. The chief exports include pepper, oil seed, palm oil, kolanuts, rubber, cocoa, ginger, hides, ivory, rice and beeswax.

The territory is administered by a governor. The capital, Freetown, has a population of 37,700, of whom only 500 are Europeans.

SIERRA MADRE, *mah'dray*, the name of two mountain ranges of Mexico, which run almost parallel with the coast on either side, enclosing the central plateau of Anahuac. Following the curves of the coast, the ranges come closer together as they extend farther southward, and a little south of Mexico City they are practically connected by a range of volcanoes. The western range, *Sierra Madre Occidental*, averages over 8,000 feet in height, and has peaks more than 10,000 feet high; the eastern range, *Sierra Madre Oriental*, is considerably lower. Orchards of olives,

chestnuts and oranges grow at the bases of the mountains.

SIERRA NEVADA, *ne vah'da*, a mountain range of Spain, extending for about sixty miles in a northeast-southwest direction, near the southeastern border of the country. The range is about twenty-five miles from the Mediterranean coast and rises very abruptly. The Sierra Nevadas are the highest mountains in the Spanish peninsula, and the highest peak is the Mulhacen, 11,420 feet. The summits of the range are covered with snow during the greater part of the year, and it is from this fact that they obtain their name, which means *snowy range*. The lower elevations and the valleys between the mountains are fertile and are covered with orchards of olives, chestnuts and oranges.

SIERRA NEVADAS, a mountain range in California, extending north and south along the eastern boundary of the state, from Tehachapi Pass, on the south, to the southern part of Oregon. By some geographers the Sierra Nevadas are considered to belong to the same range as the Cascade Mountains, which extend northward through Oregon and Washington.

The Sierra Nevadas form an almost unbroken range, with an average width of seventy miles; and they contain numerous lofty peaks, reaching altitudes of from 10,000 to nearly 15,000 feet. The most prominent of these peaks are Mount Whitney, 14,980 feet, the loftiest summit in the United States, outside of Alaska; Fisherman Peak, 14,448 feet; Mount Corcoran, 14,093 feet, and Kaweah Peak, 14,000 feet. There are several other peaks that exceed 13,000 feet. The Sierra Nevadas contain many deep, narrow valleys, with nearly vertical walls, in some instances thousands of feet in height. Of these, Yosemite Valley is a good example. These valleys, combined with the lofty peaks, make the scenery of the Sierra Nevadas noted for grandeur. There are several passes traversing the range. The best known of these are the Truckee Pass, through which the Southern Pacific Railway reaches the Sacramento Valley; the San Joaquin Pass, in the center of the range, and the Tehachapi Pass, in the south.

SIGEL, *se'gel*, **FRANZ** (1824-1902), an American general, born in Baden, Germany. He was a veteran soldier of the German revolution of 1848; went to England in 1851, and emigrated to America the following year.

From 1853 until the outbreak of the Civil War, he was a teacher and journalist. In 1861 he entered the Federal army and organized a regiment of infantry and a battery of artillery. He fought with distinguished valor at Pea Ridge, Bull Run, in the Shenandoah Valley and at Maryland Heights. After his victory at Pea Ridge he was made a major-general. From 1865, when he resigned from the army, until his death, he filled various public offices in New York City and devoted much of his time to writing.

SIGISMUND, *si'jis mund*, (about 1368-1437) Holy Roman Emperor from 1411 to 1437, and king of Bohemia in 1419. He was crowned King of Hungary in 1387, but was forced to defend his title. In 1401, with a powerful army, he reduced the country to subjection. As Holy Roman Emperor he convened the Council of Constance, which put an end to the Hussite controversy; for his desertion of John Huss, whom he had promised to protect, he was bitterly censured.

SIGMA XI. A college honorary scientific fraternity, organized in 1886 at Cornell University, Ithaca, N. Y. The name, Sigma Xi, is the initials of two Greek words, meaning "companions in zealous research". Its aim is to honor students of scientific attainments, as Phi Beta Kappa (which see) honors students of high standing in literary scholarship.

There are more than thirty chapters in as many colleges, membership being offered both to professors and students, men and women, and to other scientific workers who have achieved eminence in some field of pure or applied science.

SIGNAL CORPS. In the World War troops on battle fronts more than 250 miles in extent were moved as a unit, and those not acquainted with modern methods of directing military operations wondered how this could be done. These extensive operations were made possible because of the efficiency of the signal corps, which has been called the "eyes and nerves" of the service. The signal corps is that branch of the army whose duty it is to gather and transmit information.

The members of the signal corps are trained until they become experts in every known means of communication by day or night, from the light of a match that can be seen only for a few yards to the flashes of the heliograph, hundreds of miles away. The implements used are the telegraph, telephone, wireless, flags, lights, the heliograph, the

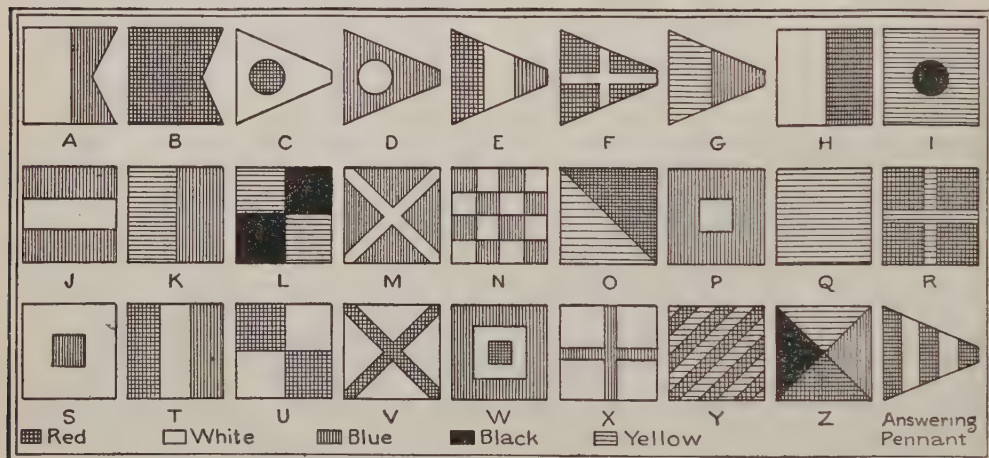
aeroplane and captive balloons, and the corps must be prepared to set up and operate any one of these devices and even to lay cables at an instant's notice.

The World War. During the World War the signal corps of the various armies were the means of enabling the commanding officers to direct the movements of their forces successfully; most of the communications they received were sent from aeroplanes flying over the enemy's lines to ascertain his position and intentions. The information thus gained enabled the commanders so to direct artillery fire as to make it most effective; it also enabled them to move troops to positions where they were most needed during an engagement.

History, in the United States. The signal corps was organized in 1860 when Major

SIGNALING, the art of transmitting messages by means of visual or auditory signs. The various methods of signaling are employed by telegraph companies, by armies, by ships at sea and by railroads. The most efficient signaling is done by means of electricity, and the dot-and-dash system in connection with which it is employed has been applied to the handling of nearly every sort of signaling device. The International Morse code (the telegraph code) is employed in all communications between the United States army and navy.

The most common method of making visual signals is by means of flags, heliographs, lanterns and torches. The first two are used only in daylight (the heliograph only in sunlight) and the latter two at night. The flag indicates the sign by its position; the helio-



INTERNATIONAL CODE OF SIGNALS

Albert J. Myer was appointed chief signal officer. During the Civil War the corps rendered efficient service in all battles and in the navy. In 1870 the Secretary of War was authorized by Congress to provide for taking meteorological observations throughout the country and forecasting the weather by the signal corps. In 1891 this part of the service was organized as the Weather Bureau (which see) and placed under the Department of Agriculture. The signal corps was then organized as a separate branch of the army and placed under the command of General William B. Hazen.

Related Articles. Consult the following titles for additional information:

Army	Navy
Flag	Signaling
Flying Machine	Telegraph, Wireless
Heliograph	Weather Bureau

graph by length of the flash, which is regulated by a shutter. The flag employed for the dot-and-dash code usually has a solid ground with the square of another color in the center. In the United States army it is orange with a red center or red with an orange center; in the navy nearly always it is blue with a white center—sometimes a red and yellow diagonal.

The sender of the flag message stands erect, facing the person who receives it, the flag pole held vertically before him, the flag above his head. The position indicating the dot brings the flag downward to his left in an arc of ninety degrees; the position indicating the dash necessitates a similar movement to the left. A pause after a word or sentence is signified by swinging the flag round to the

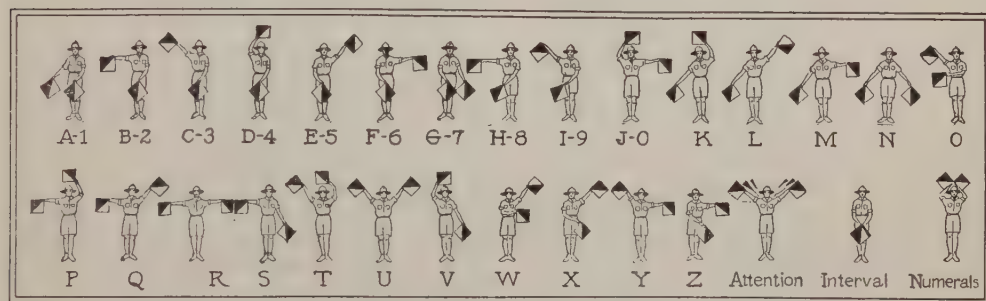
signaler's feet in a position known as "front." The lantern and torch are similarly employed, the only difference being that two lights are necessary—one of them stationary at the signaler's feet, to secure a point of reference. Flashlight communications are delivered with the aid of a shutter, which regulates the length of the beam, the long signifying the dash, the short the dot, as in the case of the heliograph.

The system of signaling known to surveyors and boy scouts is adapted from the two-arm semaphore, which is a stationary pole with two movable arms at the top. The com-

inaudible at a distance of half a mile, and it is necessary to repeat the sound every half minute. The dismal booming at regular intervals of a gun at sea as a signal of distress is another common maritime signal.

For obvious reasons the practicability of military sound signals is limited, such signals having place in the every-day routine of an army rather than serving as a means of communication in presence of an enemy.

SIGN LANGUAGE, a system of communication by gestures and movements of the hands and fingers and without speaking.



BOY SCOUTS' SIGNAL CODE

binations of positions indicate the alphabet and numerals. Two identical flags, usually square and divided in half diagonally by two colors, are employed in the semaphore code.

Although wireless telegraphy has largely superseded all other means of communication at sea, there is an international code employing twenty-six flags of different design—one for each letter of the alphabet—still widely employed for marine signaling. Other important series of signals, each of which has a distinct signification, are those employed by national weather bureaus to indicate forecasts. The heliograph, as its name indicates, is a device which reflects the sunlight. It can be used with the Morse code. (See **HELIOGRAPH**). Lanterns and torches may be used in the same way in military signaling, though this class of signals is most widely used for lighthouses.

Sound signals, though of considerable importance, are far more limited in use than the visual. The fog horn, the bugle, the whistle, the drum, each has its arbitrary signal. The fog horn is operated either by steam or by air pressure supplied from shore. These are powerful sirens, which may be heard seven or eight miles, though, owing to the effect of fog on sound transmission, they are sometimes

The simplest system is that used by the American Indians of different tribes. Their gestures and symbols were so natural and sprang so directly from their feelings, that tribes often hundreds of miles apart, who rarely came in contact with each other, were able to communicate with little difficulty. The following are typical Indian signs. *Strength* and its allied ideas, in all their applications, were represented by the motion of breaking a strong stick. *Wolf* was represented by two fingers extended at the side of the head, indicating the two erect ears. *White man* was represented by drawing a finger across the forehead, to indicate the presence of a hat or cap.

Since the sixteenth century a sign language has been employed in educating the deaf and dumb. At first the signs were of much the same sort as the Indian signs; later an arbitrary system employing the alphabet was adopted, and by means of it the deaf mute can convey any idea with his hands (see **DEAF AND DUMB**; **ALPHABET**). For long distance communication beyond the range of the voice, flags are used, the letter being indicated by the design of the flag itself or by the position in which it is held by the person communicating. See **SIGNALING**

SIGS'BEE, CHARLES DWIGHT (1845-1923), a rear-admiral of the United States navy, born at Albany, N. Y., and educated at Annapolis. He took part, under Farragut, in the Battle of Mobile Bay in 1864. As director of an expedition for exploring the bottom of the Gulf of Mexico, he introduced many original methods and received high honors from his government and from foreign countries. Sigsbee became a captain in the navy in 1897, and was in command of the battleship *Maine* at the time of its destruction in Havana, February 15, 1898. In the Spanish-American War he commanded the auxiliary cruiser *Saint Paul* and afterward the battleship *Texas*. In 1900 he was appointed chief officer of naval intelligence, became rear-admiral in 1904, and later was made a member of the naval general board. He retired from active service in 1907.

SIGURD, *se'gurd*, in northern mythology, the hero of the *Volsung Edda*, identical with the Siegfried of the Germans. When he had grown to young manhood, he was given the sword of his father Sigmund, which Odin, from whom he was descended, had bestowed, and he set forth to slay the dragon Fafnir and to gain possession of the fabulous wealth which Fafnir guarded. After killing this monster, Sigurd ate its heart and was thus enabled to understand the language of the birds, who told about Brunhilde, a Valkyr, who had been condemned by Odin to a deep sleep in a palace surrounded by flames, until she should be awakened by some hero. Sigurd rescued the sleeping maiden, who proved to be so beautiful that he at once fell in love with her. Promising to return shortly to claim her, he again set forth on his adventures, now journeying to the land of the Niblungs.

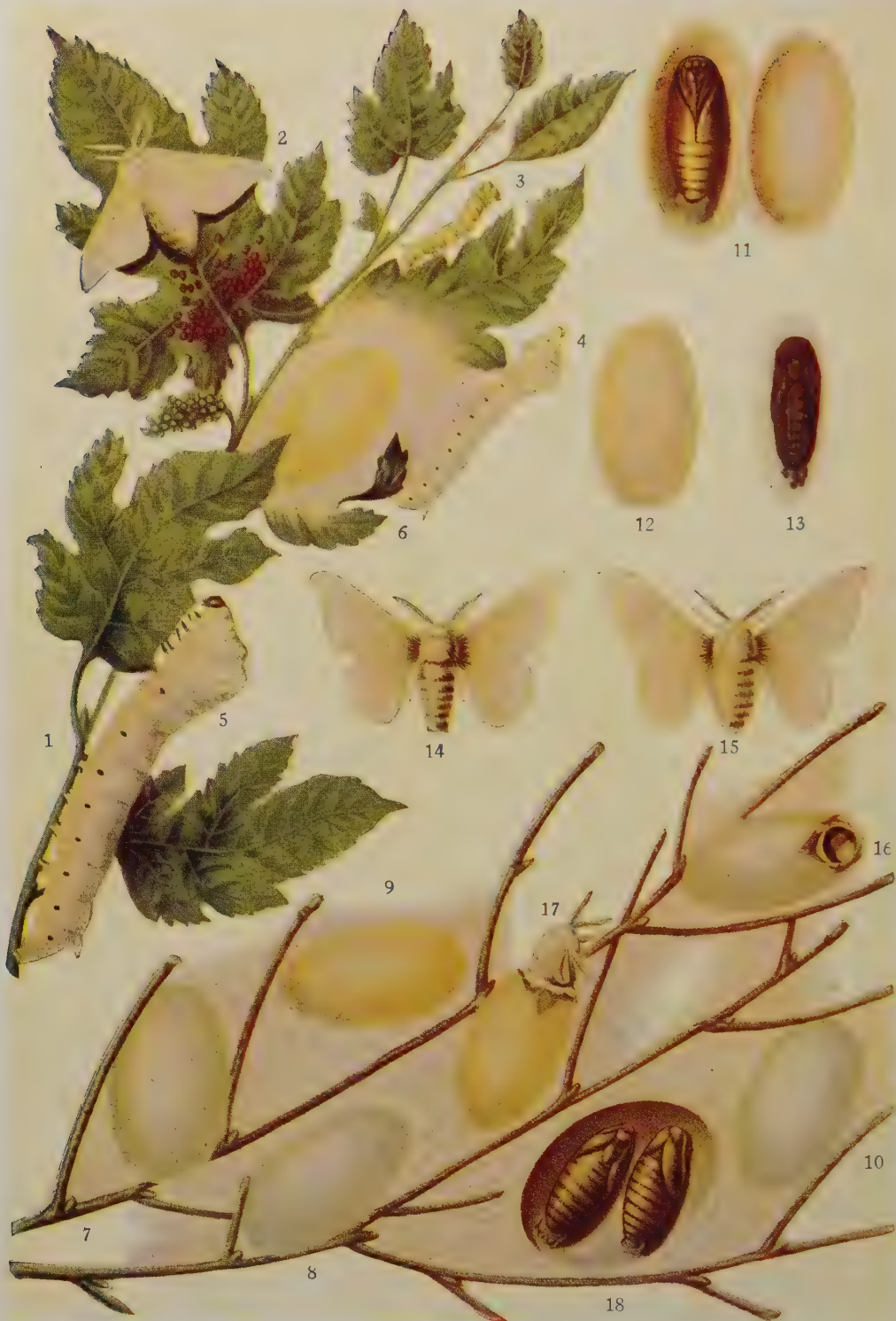
The wife of the king of the Niblungs, a sorceress, brewed for Sigurd a potion which caused him to forget Brunhilde and to fall in love with her daughter, Gudrun, whom he married. Gudrun's brother, Gunther, was desirous of marrying Brunhilde, but she could not be won without a struggle. Sigurd, assuming the form of Gunther, won Brunhilde, but when she came to the court to be married to the prince of the Niblungs, Sigurd, in spite of his love potion, recognized her and was filled with remorse. Brunhilde, unable to forgive him for his apparent faithlessness, had him put to death, and then killed herself on his funeral pyre.

SIKHS, *seeks* (from a Sanskrit word meaning *disciple*), a religious sect in Northwestern India, of which the Punjab is the principal seat. They are worshippers of one invisible God. Their founder was Nanak Shah, born in 1469, who sought to combine Mohammedans and Hindus into one brotherhood. The political state of the Sikhs was established by Govind Sinh, or Singh, the ninth ruler from Nanak, who abolished the system of castes and gave all men equal rights. Upon his death in 1708, the Sikhs gradually yielded to the superior power of the Mohammedans. A small number, however, escaped to inaccessible mountains and preserved the doctrines of their fathers and an inextinguishable hatred toward the Mohammedans. Later they left the mountains, subdued all Lahore and formed a number of independent communities, each governed by a *sirdar*.

In 1792 Ranjit Singh established himself as their despotic ruler, with the title of Maharajah. After Ranjit Singh's death, in 1839, a period of anarchy followed. In 1845 (First Sikh War) the Sikhs attacked the British under Sir Hugh Gough, at Mudki, resulting in the defeat of the Sikhs at Ferozeshah and the signing of a treaty by which Great Britain held the city of Lahore and a British resident took supervision of the government. In 1849, during the Second Sikh War, the power of the Sikhs was completely broken, and the Punjab was annexed to the British Empire in India. The Sikhs are an agricultural people noted for their great powers of endurance and courage. In 1921 their number was 3,239,000, more than two-thirds of whom are in the Punjab.

SI KIANG, *se kyahng'*, or **HONG KIANG**, a river of China, which rises in the province of Yunnan, flows east and southeast and discharges into the China Sea through numerous mouths, on one of which the city of Canton is situated. The Si Kiang is about 1,500 miles long and is navigable for large vessels about seventy-five miles.

SILESIA, *si té shi a*, before the World War the largest province of Prussia, with an area of 15,568 square miles, in the southeastern section of the Prussian kingdom. Silesia was originally a part of the old Polish kingdom, but was acquired by Austria, and in 1763, at the close of the Seven Years' War, it was ceded to Frederick the Great of Prussia (see SEVEN YEARS' WAR). In 1871 it was incorporated in the German Empire as a Prussian



SILKWORM

1, Branch of Mulberry Tree.
2, Moth laying eggs.
3 and 4, Worms in different
stages of development.
5, Full grown Worm.

6, 7, 8, 9, 10, Cocoons of various
tints on branches of trees.
11, Ordinary cocoon opened.
12, Cocoon with coarse silk
removed.

13, Cocoon after the fine
silk has been removed.
14, Male Moth.
15, Female Moth.

16, Cocoon showing opening
made by moth in coming out.
17, Moth coming out of cocoon.
18, A double cocoon opened.

province. During the World War the national aspirations of the Poles were encouraged by the allies, and at the close of the war, when the defeat of Germany made a reconstructed Poland possible, the question of ceding Silesia back to the Polish people was brought before the peace conference. According to the original terms of the Treaty of Versailles Germany was required to cede to Poland the greater part of Upper Silesia, (see **VERSAILLES, TREATY OF**). This provision met with serious objection among the German inhabitants. As a result of popular vote, a section of about 1,700 square miles joined Czechoslovakia, and about 1,600 square miles elected to join Poland.

Economically Silesia is one of the foremost German provinces, having the richest coal deposits of the entire country, zinc deposits which are among the most valuable in the world, and rich agricultural lands. In shape the country is an irregular oblong, lying northwest to southeast, and it is traversed about midway almost from one end to the other by the River Oder, flowing northward to the Baltic. Along its southern boundary lie the Sudetic Mountains, the Riesengebirge and other ranges, with peaks from 4,000 to 5,000 feet. Coal is mined in the highlands east and west of the Oder, and in normal times about 90,000 laborers are employed in the mines. The most productive agricultural district lies between the Oder and the southern mountains. The chief products of the soil are oats, rye, barley, wheat, potatoes, beets and forage plants. Cattle raising is an important industry. The weaving and flax-spinning industries are the foremost in Prussia, and there are cotton and woolen mills and earthenware manufactories. The province was formerly divided into three administrative districts, Breslau, Liegnitz and Oppeln. Population, 1910, 5,225,962.

SILICA, *sil'i kah*, a chemical compound of oxygen and silicon, one of the most widely-distributed substances in the earth. Silica forms a principal ingredient in nearly all the earthly minerals. Sand, gravel, sandstone, flint and quartz are composed almost entirely of this material, and feldspar, granite, clay, mica, slate and other rocks contain it. It occurs either in crystals or in amorphous masses. Amethyst, jasper and cat's eye, are crystalized silica; chalcedony, onyx, opal and agate are amorphous silica variously colored. Pure amorphous silica is a white powder solu-

ble only in hydrofluoric acid. Silica forms a number of hydrates which have acid properties and from which a great number of salts, known as silicates, are obtained.

SILICON, *sil'i kahn*, a non-metallic element more widely-distributed in nature than any other substance except oxygen. It does not occur in a free state, but is combined with other minerals. It forms the chief constituent of sand, flint, quartz, many other rocks and in some precious stones, occurring frequently in crystalline form. In one form silicon is a brown powder, but it may also exist in a modified form, consisting of shining metallic scales.



A Persian Making Silk

SILK. Long before man invented the spinning wheel, or had even begun to clothe himself with the skins of animals, nature had provided the world with some of the most skillful spinners ever known. One of these is a little worm about three inches long, that spins an unbroken thread from 1,500 to 3,000 feet in length. This is the silkworm, and its thread is the fine glossy fiber we know as *silk*. The silkworm is the caterpillar of the silk moth, which is characterized by a short body, stout legs and white wings, marked by black lines running parallel with the wing borders. When extended, the wings measure about two inches across.

Formation of the Fiber. In the wild state the female deposits her eggs in summer on the leaves of the mulberry tree, but in silk culture the moths are placed on pieces of paper or of muslin, on which they deposit their eggs, which are of a bluish color and about the size of a pin head. Each female will deposit from 200 to 500 eggs. Forty thousand eggs weigh about an ounce. For hatching artificially the eggs are placed in a room heated gradually up to a temperature of about 75° F. The room must be kept scrupulously clean and well ventilated. In eight or ten days the young appear. The caterpillars are then covered with sheets of paper or loose muslin, over which finely chopped young mulberry leaves are scattered. The caterpillars soon find their way through

the meshes of the cloth or openings in the paper to the leaves, upon which they begin to feed.

When first hatched, the worms are black and about a quarter of an inch long. The caterpillar stage lasts from six to eight weeks, and during this period the worm generally casts its skin four times. After casting its skin the last time the caterpillar is about two inches long, and in ten days it attains its full growth of three inches. The body consists of twelve segments, with six fore legs and ten legs on the hinder segments of the body, provided with hooks. The mouth is large, with powerful jaws, and the color is greenish-gray.

At this stage the caterpillar becomes languid, refuses food and prepares to spin its cocoon. If left to itself it will sew two leaves together and spin the cocoon between them, but in silk culture the worms are usually placed in racks containing small cells, to the sides of which the cocoon is attached. The silk thread is formed from a sticky fluid contained in two tubular glands, one on each side of the body, connected with a prominent opening in the lower lip, called the *spinneret*. This opening has two apertures, and as the fluid issues from these in minute streams and comes in contact with the air, it hardens into a strong, glossy thread. When examined under the microscope, one of these threads is seen to be composed of two strands, lying side by side. This appearance is caused by the two minute strands that issue from the spinnerets, uniting as they come in contact and forming one thread. The time required for spinning the cocoon is from three to five days. While doing the work the caterpillar attaches itself to the support by its hind legs and places the thread by moving its head from point to point. The average length of thread in a perfect cocoon is about 1,000 yards, though it may vary from 800 to 1,000 yards.

If left to themselves in a warm place, the cocoons will hatch in about three weeks, but those from which silk is to be obtained are not allowed to hatch. This is prevented by placing them in a warm oven or in hot water, which kills the pupa. It requires twelve pounds of cocoons to yield one pound of raw silk, and one ounce of silkworms' eggs will produce 100 pounds of cocoons. The female moth produces from 300 to 500 eggs. For the successful cultivation of the silkworm,

vigorous and healthy mulberry trees are necessary, the white mulberry being the favorite species. China, Japan, India, Italy, France and Spain are important silk-producing countries, though silk culture is found in several others.

Manufacture. In the manufacture of silk, the first operation is the unwinding of the cocoons and the *reeling* of the silk. For this purpose they are placed in shallow vessels containing hot water, which softens the gummy matter of the cocoons. The ends of the filaments are then conducted by guides to large reels moved by machinery. Four or five threads, from as many different cocoons, are thus brought together, and, uniting by means of the gum, form one thread. The outside fiber is coarser than that which it encloses and is usually taken off separately. The silk thus produced is called *raw* silk. Before it can be woven into cloth the raw silk must be *thrown*. Throwing is often a special trade, but it is usually conducted by machinery in large mills. It consists in spinning, twisting and reeling. Previous to throwing, the silk is carefully washed, wound on bobbins and assorted as to its quality. In the throwing machine it is again unwound from the bobbins, twisted by the revolutions of a flyer and then wound on a reel. The twist of the silk is regulated as required by varying the relative velocities of the flyer and reel. The silk thus prepared is called *singles* and is used for weaving common or plain silks and ribbons. The next operation, called *doubling*, is the twisting of two or more of these threads on one bobbin. This is done in a throwing machine, and the silk thus spun is called *tram* silk, commonly used for the weft of richer silks and velvets. Two or more of these threads of tram silk twisted in the throwing mill together constitute *organzine*, a species of silk thread used for warps of fine fabrics. But in tram silk the threads are all twisted in one direction, forming individual strands like twine, whereas in organzine the collected threads are twisted in an opposite direction to the twist of the strands, like cable or rope. The silk in this condition is called *hard*, in consequence of the gum, which is, however, separated by careful boiling.

Silk is woven on looms similar to those used in weaving cotton and wool (see **WEAVING**). In the United States power looms are employed wholly, but in Europe many hand looms are still found, while in China they



1



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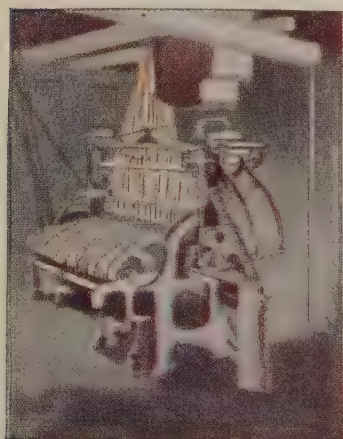
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6



7



8



9

SILK

- 1, Feeding mulberry leaves to silk worms.
- 2, Picking cocoons from branches.
- 3, Weighing and sorting cocoons.

- 4, Reeling silk from cocoons.
- 5, Rewinding silk into skeins.
- 6, Sorting skeins.

- 7, Weaving silk.
- 8, Silk products.
- 9, Silk factory.

Outline on Silk

I. SILK MOTH

- (1) Description
 - (a) Body
 - (b) Legs
 - (c) Wings
 - (d) Number of eggs

II. SILK WORMS (Wild)

III. SILK WORMS (Culture)

- (1) Eggs
 - (a) Number
 - (b) Deposited when?
 - (c) Temperature for hatching
 - (d) Time of incubation
- (2) Caterpillars
 - (a) Early appearance
 - (b) Care
 - (c) Food
 - (d) Development
 - (e) Casting size
 - (f) Body
- (3) Cocoon Development
 - (a) Racks
 - (b) Tubular glands
 - (c) Spinneret
 - (d) Time
 - (e) Length of thread
 - (f) Hatching
 - Time required
 - Prevention of

- (g) Proportionate weight in silk

- (4) Origin of Industry

IV. MANUFACTURE

- (1) Unwinding cocoons
- (2) Reeling silk
 - (a) Description of process
- (3) Raw Silk
 - (a) Why and when washed?
 - (b) How wound?
 - (c) How assorted?
- (4) Throwing—necessary before weaving
 - (a) Spinning, twisting, reeling
 - (b) Usually done by machinery
 - (c) Regulation of twist
 - (d) Single
 - (e) Sewing silk
- (5) Doubling
 - (a) Tram silk
 - (b) Threads twisted in one direction

- (6) Organzine

- (a) Threads twisted in opposite directions

- (b) Hard silk

- (7) Weaving

- (a) Modes

- (b) Peculiarities

- (c) Intricacies

- (8) Waste Silk

- (a) Consists of what?

- (b) Processes

- (c) Use

V. COUNTRIES

- (1) Raw Silk

- (a) China, Japan, Italy, France

- (2) Manufactured Silk

- (a) France, Germany, Switzerland, United States

VI. ARTIFICIAL SILK

- (1) Composition

- (2) How produced

- (3) Value

- (4) How extensively used?

Questions on Silk

Give three reasons why silk is more expensive than cotton.

Name five articles in your home that are made from silk.

What is the length of a thread furnished by a cocoon?

Why are not cocoons intended for silk permitted to hatch? How is this prevented?

How many pounds of cocoons are required to yield one pound of raw silk?

How many pounds of cocoons will an ounce of silkworms' eggs produce?

During the caterpillar stage how many times does the worm cast its skin?

Describe the formation of the fiber.

How long a continuous thread can the silkworm spin?

What city in the United States produces the most silk cloth?

Why is tin sometimes referred to in silk manufacture?

Is artificial silk an acceptable substitute for real silk?

are used entirely. The fineness and softness of silk fiber make it possible to manufacture from it a greater variety of fabrics than from any other fiber, and these products range in fineness from the gossamer web to the heavy plush used for winter garments. Ingenious looms have been invented by American and French operators, as well as special attachments for weaving intricate patterns, which are now produced at moderate cost.

The manufacture of sewing silk is really a continuation of the process of throwing. It is made by continuing to double and twist the threads together, until a thread of the desired size and strength is obtained. This branch of the silk industry is confined to the United States, and it has become of considerable importance.

The manufacture of waste silk is also an important industry. Only about seven-tenths of the silk on a cocoon can be wound onto the reel. The remainder, together with the coarse fiber taken from the outside of the cocoon and the silk obtained from defective cocoons and those from which the moths have been allowed to escape, constitute the waste. This is subjected to a number of processes, such as washing, combing and spinning, until it forms the spun silk of commerce, which is used for silk yarn and for woof in some silk fabrics.

Production. The silk industry seems to have originated in China, and the Chinese were the first to make known the value and usefulness of the fiber produced by the silkworm. The leading countries in the production of raw silk are China, Japan, Italy and France, while the leading countries in its manufacture, in the order of their importance, are the United States and France. The annual output of silk manufactories in the United States averages over \$196,000,000. The leading states are New Jersey, Pennsylvania, New York, Connecticut and Massachusetts. Paterson, N. J., is the chief center of the industry. The color plate shows the various stages of evolution of the silkworm and silkworm moth.

SILK, ARTIFICIAL, any fine fiber having the appearance of silk and prepared to be similarly used. Both cotton and wood pulp are chemically treated to produce a "silky" fiber, which is much cheaper than silk and for certain purposes is a suitable substitute for it. After the cotton is carded it is steeped in a mixture of nitric and sulphuric acid,

and is then dissolved in a mixture of ether and alcohol. The product is then passed between steel rollers, which squeeze it through tiny tubes. From these it passes into a bath of nitric acid and water. The resulting fibers are wound on reels, then are dried, washed, spun and dyed. Wood fiber is similarly treated.

SILKWORM. See **SILK**.

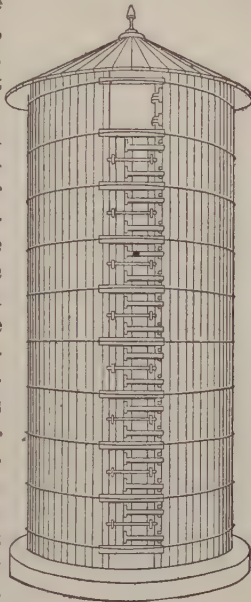
SILKWORM GUT, a material obtained from silkworms and used for the hook end of fishlines. When the silkworm grubs are ready to spin they are soaked in strong vinegar and the silky substance is then drawn from the dead worms and submitted to a special process. About 25,000 pounds of threads are required to produce a pound of gut. The gut is valued for its tenacity and invisibility in the water.

SILO'AM, a pool situated at the southern end of the eastern hill of Jerusalem, the water of which is supplied by the Virgin's Spring and is brought to the pool at the entrance to the Tyropæon valley by a tunnel over 1,700 feet in length. At the Siloam end of this tunnel an important inscription was found in the wall in 1880, which is generally assigned to Hezekiah. He is said to have "made the pool and the conduit, and brought water into the city" (II *Kings* XX, 20). However, other authorities date the inscription back to 200 B. C.

SILO AND SILAGE. A *silo* is a structure in which green crops are stored and preserved in succulent condition for winter feed for stock; *silage*, or *ensilage*, is the name of the fodder stored in the silo. The silo was introduced into America from Europe in 1875 and has rapidly gained favor. While a silo may be square or rectangular, the cylindrical form is found to be the most economical and best adapted to the preservation of the silage. The entire structure must be as nearly air tight as possible, since the presence of air causes decomposition; the inside walls must be perpendicular and smooth to permit uniform settling of the inclosed mass of silage; and this must be of considerable depth so that there will be sufficient pressure to keep the mass compact. Consequently the height should be between twenty-five and thirty feet, while the diameter may vary according to the needs of the farmer constructing it. Wood has been the material generally used in building silos but concrete is rapidly winning favor, as it is cheap, and furnishes an

air-tight, water-proof and vermin-proof structure.

A cylindrical silo 20 feet in diameter and 20 feet high will contain 105 tons of silage and one of the same diameter 25 feet high, will contain 143 tons; while a silo 25 feet high and 25 feet in diameter will contain 224 tons. These figures enable a farmer to judge quite accurately as to the size of a silo which he wishes to build, and the work should be done by one experienced in constructing buildings of this sort. All things being equal, the cylindrical silo is the best. It contains no angles, it is more easily kept tight and is easily cleaned when emptied. Moreover, the cylindrical silo is the strongest form for a structure of this sort, and it is not easily pressed out of shape by the pressure from within.



A PRACTICAL STAVE
SILO

In locating the silo on dairy farms the farmer should carefully consider two things: first, convenience in handling the silage, which must be done at least twice a day; and secondly, the position of the silo with reference to the stable, so that odors arising from it will not penetrate the stable, at least during milking time, since milk readily absorbs odors of this sort. The silo should be as near the stable as possible without danger of contaminating the milk. If the cows are fed after milking time and the stable is thoroughly aired before milking time, there is but little danger from these odors.

The bottom of the silo should be cement or plank, but cement is preferable, since a plank bottom causes a loss of five or six inches of the silage next to it. The sides should be airtight, but the roof should provide ample ventilation. With these points in view, the farmer desiring to construct a silo knows about what to require of the builders. The illustration here given is of a very satisfactory type silo.

The silo combines the advantages of storing a large amount of feed in a small space and of keeping it in its natural state until used. Moreover, by this means of storage, the farmer can raise upon a few acres fodder, which, if raised under ordinary conditions, would require many times the acreage, and, in addition to this, the silage is much better adapted to the purpose of feeding milk cows than any other sort of dairy food.

Silage, or Ensilage. Various crops are suitable for silage, but experiment has shown that corn is the most desirable. Alfalfa and clover are also used to good advantage. Experiments have shown that the best results are obtained from corn silage when the crop is cut just as the ears are beginning to glaze. As the corn is cut in the field, it is hauled to the ensilage cutter, which cuts it into pieces about an inch in length, using the stalks and ears without separation. As the cut silage leaves the machine, it is carried by an endless belt containing buckets, or by a blower, to the silo. If the plant is dry it should be thoroughly wet after leaving the cutter, before it is packed. Otherwise it soon becomes mildewed. In case of dry crops it is the practice to run a stream of water over the silage as it leaves the cutter. The water tends to make the mass in the silo air tight, and thus prevent fermentation and decay.

When the silo is filled, the ensilage should be covered by some preparation which will exclude the air. Local conditions determine what can be used to the best advantage. The doors in the side of the silo should, of course, be kept closed until the contents have been lowered to each succeeding door. Silage protected from the air will be kept fresh and succulent through the winter, and it is practically as nourishing and healthful as the grass obtained in the average pasture.

SILURIAN PERIOD, a division of geologic time, the third of the Paleozoic Era, following the Ordovician Period, and preceding the Devonian. It is named for the Silures, an ancient people of Britain, where the rocks were first studied. The formations are of wide extent and are found in all the continents. The rocks are largely limestones and sandstones and have been divided into a number of series and stages with local names. In the United States the most noted of these are the Niagara, the Onondaga and the Lower Helderberg. The formations of this system make up the greater part of the

Appalachian Mountains and the sides of the celebrated Delaware Water Gap, and extend southward as far as Tennessee. The gypsum and salt beds of New York and the iron ore along the Appalachian Mountains belong to these formations. See DEVONIAN PERIOD; PALEOZOIC ERA; GEOLOGY.



In a Silver Mine

SILVER, a precious metal, below gold and platinum in value. Silver appears to have been known almost, if not quite, as early as gold. It was used as money in the time of Abraham, 2000 B. C. The foundations of the Hebrew Tabernacle were of silver, and the metal is mentioned among the offerings presented at the completion of that sacred edifice.

Properties. Pure silver is of a fine white color. It is softer than copper but harder than gold, and is about ten and one-half times as heavy as water. Its chemical symbol is *Ag*, which stands for *argentum*, the Latin name for silver. It is next in malleability to gold, having been beaten into leaves only $\frac{1}{100000}$ of an inch in thickness. It may be drawn out into a wire much finer than a human hair. It excels all other metals as a conductor of electricity, and is second only to gold as a conductor of heat. Silver melts when heated red hot, or at 1761° F., and it may be boiled and volatilized by very strong and long-continued heat. When in a molten state it absorbs twenty-two times its volume of oxygen, which it gives off on cooling. If it cools so quickly that a crust forms on the surface before the gas escapes, bubbles of gas explode and break through the crust. This is called *spitting*.

Compounds. Silver forms a number of compounds, several of which are extensively used in the arts. *Oxide of silver* is produced by dissolving silver in a solution of nitric acid and precipitating with an alkali. The compound called *horn silver* or *chloride of silver* is obtained by dissolving silver in nitric acid and mixing the solution with a solution of common salt. When exposed to the light it turns to a blackish color, hence its great use in photography. *Bromide of silver* is the most sensitive to light of all

known solids. It is used for coating the "dry plates" employed in photography. When silver is long exposed to the air, it acquires a covering of a violet color, which deprives it of its luster; this coating is sulphide of silver.

Of the combinations of acid and silver, the most important is *nitrate of silver*, obtained by dissolving silver in nitric acid. If the silver and acid are pure, the solution of silver nitrate is colorless, very heavy and caustic; it stains the skin and all animal substances an indelible black; after evaporation it deposits, on cooling, transparent crystals of nitrate of silver.

Alloys. Silver readily forms alloys with iron, tin, lead, copper and mercury. Pure silver is too soft for most uses and is alloyed with copper. In the United States 900 parts silver to 100 parts copper form the standard alloy for the silver coin. In Great Britain and its colonies the proportions for sterling silver are 925 parts silver to seventy-five parts copper. In countries of the Latin Union the ratio is 835 parts silver to 165 parts copper. The value of silver varies slightly, according to condition of supply and demand; hence gold is taken as the standard in measuring the value of precious metals.

Uses. The most extensive uses of silver are for coinage, and the manufacture of table ware and decorative articles. It is also used for silvering mirrors, and its compounds are employed in photography, in medicine and for other minor purposes.

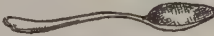
Ores. There are five important silver ores, namely, native silver, vitreous silver, or silver glance, black silver, red silver and horn silver. Native silver occurs principally in veins, traversing gneiss, clay slate and other paleozoic rocks, but not usually in great quantity. It often forms a natural alloy with gold. Vitreous silver presents itself in various shapes and is of a blackish lead-gray color, with a metallic luster. It is malleable, about as hard as gypsum, and is subject to tarnish.

Black silver generally occurs in granular masses, of an iron-black color. It is about as hard as gypsum and presents a smooth surface when cut with a knife. This mineral is a composition of silver with antimony and sulphur and traces of iron, copper and arsenic. It is found in veins, along with other ores of silver, and is a valuable ore for the extraction of silver.

Red silver is found in crystals and often in masses, in grains and even as a fine powder. It is a double sulphide of silver and antimony, containing, on an average, sixty per cent of silver. It occurs in veins with other silver ores, and with galena and blende. Horn silver, or silver chloride, occurs in crystals and also in crusts and granular masses. It contains about seventy-six per cent of silver. It is found in the upper parts of veins in clay slate and also in beds with other silver ores or with iron ore. The above are the ores of silver from which silver is chiefly extracted; but large quantities are obtained from ores of lead and copper, which are worked primarily for these metals.

Reduction of Ore. Silver is obtained from its various ores by smelting, amalgamation and chemical processes which are long and complex. It is most easily separated from lead ore, since the lead melts at a much lower temperature and can be drawn off, leaving the silver free. Before the ore is treated by any of the other processes it is ground to a powder in stamp mills, and the pulverized ore is thoroughly washed in running water, while passing over vibrating tables. The particles containing metal are heavier than the others and sink into grooves, while the light particles are carried away by the water. This process forms what is called *concentrate*, from which the metals are extracted. See METALLURGY.

Production. The silver mines of North and South America are incomparably more important than those of all the rest of the world. The Mexican mines were worked before the Spanish conquest and then produced large quantities of silver. Their total yield has been estimated at over \$3,000,000,000. Great deposits of silver have been discovered in Nevada, Arizona, California, Colorado,

Mexico		77
United States		70
Canada		34
Australasia		17
Nevada		15
Montana		13
Utah		12

Figures Represent Millions of Ounces

LEADERS IN PRODUCTION

Idaho, Montana, New Mexico and Utah. Silver ore, chiefly silver-bearing galena, has also been found in great quantities in the Barrier

Ranges of New South Wales. Some of the mining concerns here are the largest in the world. Considerable quantities of silver are also produced in Europe. The world's production of silver in 1916 amounted to \$107,519,408. Of this amount the United States produced \$51,083,529; Canada, \$17,477,348; Mexico, \$15,677,866; Peru, \$6,466,513; Japan, \$3,514,927; Spain, \$3,134,007, and New South Wales, \$1,923,151. Owing to the World War, the production of European countries was below their former average.

SIMCOE, JOHN GRAVES (1752-1806), an English general and the first governor of Upper Canada, born in Northamptonshire, England, and educated at Merton College, Oxford. He came to New England during the Revolutionary War, commanding the Queen's Rangers. He took an active part in the war and surrendered with Cornwallis at Yorktown in 1781. He served as governor of Upper Canada in 1791-1794; then became governor of Santo Domingo in 1796-1797, and in 1806 was appointed commander in chief of India. He wrote a *History of the Operations of a Partisan Corps Called the Queen's Rangers*. London, Ont., was founded by him, and Lake Simcoe and the town of Simcoe were named in his honor.



JOHN GRAVES
SIMCOE

SIMILE, *sim'i lee*, a figure of speech in which some form of resemblance between two objects essentially different is designated by means of some definite word, either *as*, *like* or *so*. It is this specific statement of comparison which distinguishes simile from metaphor, wherein the likeness is implied (see FIGURES OF SPEECH). The following are examples of simile:

Life, LIKE A DOME of many coloured glass,
Stains the white radiance of Eternity.

As idle AS A PAINTED SHIP upon a painted ocean.
It cracked and growled and roared and howled

LIKE ICICLES in the sun.

My life is LIKE A STROLL upon the beach.

SIMONIDES, *si mon'i deez* (556-468 B. C.), a Greek lyric poet and one of the most

versatile men of antiquity. He visited Athens, and after the death of Hipparchus, who had treated him very generously, he proceeded to Thessaly, where he obtained the patronage of powerful families. He later returned to Athens, where in competition with Aeschylus he was awarded the prize for his elegy on the warriors who fell at Marathon. When eighty years of age Simonides was victorious in another celebrated poetical contest, his fifty-sixth victory of this nature. Shortly after this he was invited to the court of Hiero, at Syracuse, where he remained till his death. Simonides excelled in his triumphal odes and elegies, which were polished and rhetorical, and gave him rank with Pindar, his contemporary and rival. See PINDAR.

SIMON PETER. See PETER.

SIMOOM', or **SIMOON'**, a hot, dry wind that blows over the Sahara and Arabian deserts, carrying great clouds of dust. It is caused by the intense heat of the sandy plains. The air, heated by contact with the noonday burning sand, ascends, and the inflow of colder air from all sides forms a whirlwind, or miniature cyclone. Its intense, dry, parching heat, combined with the cloud of dust and sand which it carries with it, makes this wind very destructive to both vegetable and animal life. Caravans cannot proceed through it. When suddenly overtaken by one of these sandstorms travelers, to escape suffocation, lie down and cover their heads with blankets, and camels bury their noses in the sand. The simoon may last a few minutes or it may continue for days.

SIMPLON, a mountain pass of Switzerland near the frontier of Piedmont, Italy, over which the famous Simplon road, one of the greatest engineering feats of modern times, was constructed by Napoleon in 1800-1806. This pass, which is one of the most important routes across the Alps, is about thirty feet broad and forty-two miles long, and is carried over 611 bridges and through numerous great tunnels.

The Simplon Tunnel, a railway tunnel through the Alps at this point, was commenced in 1898 and completed in 1906. It is the longest railway tunnel in the world, consisting of two tubes, each having a single track. The length is over twelve miles.

SIMPSON, SIR JAMES YOUNG (1811-1870), a Scotch physician, the most eminent medical practitioner of his day and the discoverer of the anesthetic properties of

chloroform. He was born at Bathgate, and was educated at the University of Edinburgh. For his discovery of chloroform anesthesia and its introduction at childbirth and his invention of a means of arresting the loss of blood in hemorrhage, he received honors from numerous scientific societies in America and Europe. He was created a baronet in 1867. See ANESTHETIC; CHLOROFORM.

SIMS, WILLIAM SOWDEN (1858-), an American naval commander, promoted to the rank of vice-admiral in 1917, after America entered the World War. He was born at Port Hope, Ontario, and was educated for the sea at the United States Naval Academy at Annapolis, from which he was graduated in 1880. Between 1897 and 1900 Sims served as naval attaché to the American embassies at the capitals of France and Russia, and during Roosevelt's administrations was inspector of target practice at the Bureau of Navigation. Following this he was commander of the *Minnesota*, a member of the Naval War College, commander of the Atlantic torpedo flotilla, president of the Naval War College, and commandant of the Second Naval District. In August, 1916, he was promoted to the rank of rear-admiral. After America entered the World War he was placed in charge of the American squadron operating in European waters, and while he was abroad he was made vice-admiral, thus attaining the rank of the chief British and French officers with whom he was associated.

SINAI, *sí'ni*, or *sí'na i*, a mountain in Arabia, at the base of which Israel encamped and from the summit of which Moses is supposed to have received the Ten Commandments. It is one of three peaks of the mountain range on the peninsula of Sinai, which projects into the Red Sea, between the gulfs of Suez and Akabah. In literature the word Sinai is used figuratively to symbolize the legal side of God's treatment of men.

SINCLAIR, UPTON [BEALL] (1878-), an American author and one of the founders of the Intercollegiate Socialist Society, was born at Baltimore, Md. He was educated at the College of the City of New York and at Columbia University. Because of his exposure of conditions at the Chicago stockyards in his novel, *The Jungle*, a government investigation was undertaken. To carry out his ideas on coöperative housekeeping, the Helicon Home Colony was founded in 1906 near Englewood, N. J., but fire destroyed its

buildings before the experiment was fully worked out. In 1917 Sinclair withdrew from the Socialist party because of the opposition of this body to American participation in the World War. His writings include *Springtime and Harvest*, *The Industrial Republic*, *King Midas*, *The Money-Changers*, *The Cry of Justice*, *King Coal*, *The Brass Check* and *The Story of a Patriot*.

SINDIA, the hereditary title of the head of the Mahratta dynasty which played a conspicuous part in the history of India in the eighteenth and nineteenth centuries. The Sindia arose in Gwalior, which was founded in 1738 by Ranoji Sindia. In 1781 Madaji Sindia, the most powerful member of the Mahratta confederacy, negotiated a peace between the British and the Mahrattas, and having introduced European discipline and tactics into his army, possessed himself of Delhi, Agra and the person of the Mogul emperor, in whose name he subsequently acted. Several of his successors engaged in open conflict with the British.

SINDING, *sin'ding*, CHRISTIAN (1856-), a Norwegian musical composer and teacher, educated in Germany, and Austria. His compositions suggest the spirit of the Northlands and are characterized by charm of melody and excellence of construction. His principal works include a pianoforte quartet and quintet, three violin sonatas, two symphonies and the *Rondo Infinito* for the orchestra; his opera *Der heilige Berg* was produced in Berlin in 1910.

SINGAPORE, a British colony, forming one of the Straits Settlements and consisting chiefly of the island and city of Singapore, with a few smaller islands. The principal island is about twenty-seven miles long and fourteen miles wide and has an area of 217 square miles. Its location gives it a hot climate throughout the year, though it is not unhealthful. The chief interest centers in the city of Singapore. The chief public buildings consist of the Cathedral of Saint Andrew's, the townhall, the courthouse and the Roman Catholic Cathedral. It has one of the finest botanical gardens in the world. Singapore is the meeting point of numerous important ocean routes. It is a free port and carries on an extensive trade. Population, 1921 census, 423,768, of whom over sixty per cent were Chinese.

SING'ING, the art of making music with the human voice; also the music thus pro-

duced. The mechanism by which this music is made consists of the lungs, which supply the air; the muscles of the diaphragm, or chest, which force the air through the throat, and the vocal chords of the throat, whose vibrations produce the sound. Difference in pitch of voice is due to the length of the vocal chords; difference in quality is due to the differences in the shape of the cavities of the mouth and nose and to the different use of the muscles of the larynx. The compass of the human voice is from about C below the bass clef to F above the treble, though no single voice has this compass, the average being about twelve to fifteen tones, and the greatest, slightly over three octaves. The total range of the voice is divided into four parts, the *soprano*, including the highest tones, beginning at about E on the treble clef; the *alto*, or *contralto*, including those from about G on the bass clef to C on the treble clef; the *tenor*, including the range of the contralto, but extending somewhat lower, and the *bass*, including all the lower notes, beginning at about C above the bass clef and extending downward. See MUSIC.

SINGLE TAX, the name given by common consent to the economic reform which proposes the abolition of all taxes on personal property and the raising of public revenues, local, state and national, by a single tax on land values, irrespective of improvements, this tax eventually to become equal to the annual rental value of the land. The theory of the single tax is based upon Ricardo's "law of rent," which, briefly, is this: "The economic rent of a given piece of land depends upon (or is determined by) the excess of its product over that which can be obtained with an equivalent effort from the least productive land in cultivation." By taking this economic rent (that is, the excess of product of a particular piece of land, over that which can be obtained from the least productive land in use—or at the so-called "margin of cultivation") for public purposes (taxes), those who are now holding the lands without using them, in order to secure in the future a higher value, would no longer be able to do so with profit, since the benefit which they have been receiving would now be confiscated to the State. Thus, vast areas of land would be thrown open to practically free employment; the opportunities for labor would be nearly equal, and the reward to labor would be approximately the

whole product, except what would be taken for interest on the capital invested.

In proof of their assertions, single taxers point to statistics. For instance, the unimproved land within the limits of the city of Chicago constitutes a large part of the total area and would furnish employment for thousands of persons. They justify the confiscation of land values (for the taking of the whole rental value would amount to the confiscation of the land), partly on the basis that this value is created by the community and cannot be rightfully monopolized by individuals. Furthermore, they contend that private ownership of land must eventually reduce the majority of mankind virtually to a condition of slavery; for wealth can be produced only by the application of labor to land (that is, to all natural agencies, including earth, air, water); therefore, either the owner of the labor (man) or the owner of the opportunity to labor (land) can control the laborer and can make such terms with him as he pleases. This condition is brought constantly nearer by the withholding from use of large tracts of land, while the growth of population and other conditions constantly increase the competition of laborers for employment, that is, for the right to use the land. Believing as they do that the original act of reducing land to private ownership was wrong and worked an injustice, not only upon those from whom the land was taken, but upon all who came after, they believe the State has a perfect right to reverse this step and retake for the community, by taxation, the value of land, without compensating the present owners.

The single-tax theory has gained many adherents, especially in England and the United States, during the last quarter of a century, chiefly through the propaganda of Henry George, an American economist who first thoroughly elucidated the principles of the theory, though the idea had been before developed in a crude way by French economists. George's first great work on the subject was *Progress and Poverty*. It immediately became popular and has been translated into all the languages of the civilized world (see GEORGE, HENRY). But the theory has never been given a practical test, though it has been partially applied in New Zealand and in small divisions of other countries. At Fairhope, Ala., is a small colony of single taxers who are attempting to work out their

principles in practical life. Their efforts have been attended with some success. Some of the important demands of the single taxers are being accepted and incorporated in the laws of several of the states, especially the abolition of the tax on personal property, the reform being urged in many instances on the ground that this form of property is so easily concealed that persons of small means pay vastly more, in proportion to their ability, than those of wealth, and, further, that the methods of assessment place a premium upon perjury and corruption.

The main objections that are urged to the single tax are the following: (1) That it would relieve a large class of persons from support of the government; (2) that the tax would be inelastic; (3) even though the justice of the principle of the single tax be granted, for the sake of argument, the fact that private ownership of land has been recognized for centuries and has led to the development of many interwoven interests, would make it inexpedient for the community to recover possession of the land by the means proposed. See TAX; RENT.

SING SING, N. Y. See OSSINING.

SINN FEIN, *sin fayn*, a society of Irish nationalists whose sole aim is to overthrow British rule and make Ireland an independent state. In the ancient Gaelic tongue of Ireland, *Sinn Fein* meant *ourselves alone*. Its first use politically was as the name of a patriotic newspaper, the readers of which furnished the nucleus of the society. With the growth of the society, which is composed largely of leading Irish thinkers, the *Sinn Fein* has become in recent years a "movement." In April, 1916, an armed rebellion of Sinn Feiners broke out in Dublin, but was put down by the British, and Sir Roger Casement and other leaders were executed. The movement did not perish, however. On the contrary, the party gained such strength that it won about seventy seats in the Parliamentary election in December, 1918. The elected delegates refused to take their places in the Parliament at London, but gave all their energies to setting up an independent republic with a Parliament at Dublin. See IRELAND, subhead *History*.

SIOUAN, *soo'an*, **INDIANS**, those related Indian tribes who occupied the land of the upper Mississippi and Missouri valleys, far into Canada, and included detached tribes east of the Mississippi. Among Siouan

tribes are the Dakota, or Sioux, the Omaha, the Winnebago, the Assiniboin, the Osage and the Quapaw. Some of the tribes were bitterly hostile to the whites, and the fierce and warlike temperament of such tribes as Dakotas was the source of considerable trouble to the United States government for many years.

Related Articles. Consult the following titles for additional information:

Assiniboin	Quapaw	Sitting Bull
Osage	Sioux	Winnebago

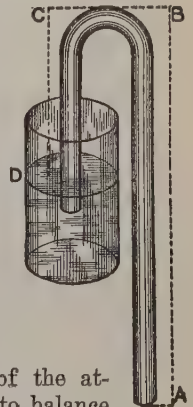
SIoux, *soo*, or **DAKO'TA**, the largest tribe of Indians dwelling west of the Mississippi, and the most troublesome of all the tribes belonging to the Siouan group. Originally they occupied the country between the Arkansas River and the vicinity of Lake Winnipeg and west almost to the Rocky Mountains. Because the United States government failed to carry out certain agreements made with them, they went on the war-path in 1862 and killed nearly 1,000 settlers. Another uprising in 1876 caused the death of General Custer and all his men, in the battle of the Little Big Horn. Eventually the Sioux were subdued and retired to their reservations in the Northwest. They now number about 22,000, and are brave, intelligent and progressive. See **SITTING BULL**.

SIoux CITY, **IOWA**, the second city in size in the state and the county seat of Woodbury County, is located on the Missouri River, at the mouth of the Big Sioux River, 156 miles northwest of Des Moines. It is on the Illinois Central, the Chicago & North Western, the Chicago, Saint Paul, Minneapolis & Omaha, the Great Northern, the Chicago, Milwaukee & Saint Paul and the Chicago, Burlington & Quincy railroads. The city is the sixth largest live stock market in the United States, having large meat packing plants and stockyards that do a large business. It has thirty-four wholesale and jobbing houses and 150 factories, including railroad repair shops, brick and tile works, planing mills, and other industrial establishments. Two bridges cross the Missouri River, one, a combination bridge affording facilities for railroads, street cars, vehicles and foot passengers. Sioux City is the seat of Morningside College and Trinity College, has six hospitals, a Federal building, a city hall, and a Carnegie Library. Its largest park is Stone Park, containing 800 acres. It has a Y. M. C. A. building and an auditorium seating 3,000. A \$750,000 courthouse has recently been erected. Sioux city was

first incorporated in 1857, became a city of the first class in 1886, and adopted the commission plan of government in 1910. Population, 1910, 47,828; in 1920, 71,227, a gain of 49 per cent.

SIoux FALLS, **S. D.**, the county seat of Minnehaha County, about ninety miles north of Sioux City, Iowa, and eight miles from the Iowa State line, on the Big Sioux River and on the Great Northern, the Illinois Central, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & Saint Paul and the Chicago, Saint Paul, Minneapolis & Omaha railroads. The river has a series of falls, descending about 100 feet in half a mile and furnishing extensive water power. The city contains a large packing plant, a biscuit factory, brickyards and extensive granite quarries, from which are taken a beautiful pink jasper building stone. It has large wholesale houses, and is the center of a valuable trade. The educational institutions include the Sioux Falls College, a Lutheran normal school, All Saints' School (Episcopal) and the state school for the deaf. The city is the seat of an orphans' home and of the state penitentiary. It has a Federal building, and a Carnegie Library. Sioux Falls was chartered as a city in 1883. It adopted the commission form of government in 1909. Population, 1910, 14,094; in 1920, 25,176, a gain of 79 per cent.

SIPHON, *si'fahn*, a tube with one curved end, shaped like an inverted U, used to convey a liquid from a higher to a lower level. The illustration shows the principle upon which the siphon works. If all the air is exhausted from the tube and the two ends are placed in liquid, the pressure of the atmospheric air on the surface at *D* will force the liquid up into the tube to the level *CB* and cause it to flow into the arm *BA*. A liquid would not flow through a siphon if the highest point in the tube were thirty-three feet above the level *D*, because the pressure of the atmosphere is not sufficient to balance its weight at higher levels. The principle of the siphon is employed in devices for conveying water over slight elevations, and in emptying casks and other vessels.



SIR, a title formerly meaning *master, lord* or *sovereign*. It is a contraction of *sire* formerly applied to sovereigns, but is now most frequently applied to those upon whom the British government wishes to confer distinction because of their position in the nobility, or because they have rendered some distinguished service to mankind or to the British government. Thus, Henry Bessemer, the inventor of the process of making Bessemer steel, was given the title of *Sir*. Since *Sir* was the distinguishing title of knighthood in the Middle Ages, one upon whom the title is conferred is said to be knighted. See CHIVALRY.

SIREN, an instrument for the production of continuous sounds, used extensively in England and France during the World War as a warning for the approach of air raids. Very large sirens are used for fog signals at lighthouse stations, steam being employed instead of air, with a trumpet-shaped horn to direct the sound. The siren is also used for measuring the number of sound waves, or vibrations, per second, which produce a note of given pitch. In its original form it consists of a disk, with a circular row of oblique holes, revolving close to the top plate of a wind chest, perforated with corresponding holes, sloping in the opposite direction, so that the jets of air from the latter, passing through the former, keep the disk in motion. These jets of air also produce a note, corresponding to the rapidity with which the plate is revolved or the frequency with which the holes in the plate coincide with those in the chest. The number of coincidences or vibrations in a given time is shown by indices connected with the axis of the disk.

SIRENS, in Greek mythology, the name of several sea nymphs, who by their singing enticed sailors to their island, near the Sicilian coast, and then killed them by starvation. Warned of the danger, when Ulysses approached their island, he stopped the ears of his companions with wax, bound himself to the mast, and thus escaped. The sirens then threw themselves into the sea, where they became formidable rocks. Another version is that they hurled themselves into the sea when vanquished in music by Orpheus.

SIRIUS, *seer'ius*, the dog star, the brightest star in the heavens, situated in the constellation Canis Major, or the Great Dog. It is estimated to have more than thirteen times the sun's magnitude. A companion

star to Sirius was discovered in 1862 which gives out one ten-thousandth part of the light of Sirius.

SIROCCO, *si rok'o*, the Italian name for a hot wind, but properly applied to any warm wind of sufficient duration to produce a general climatic change. Siroccos are common over the southern portion of the United States and the countries bordering the Mediterranean in the north, being especially the scourge of Sicily, although the term particularly refers to the warm wind of the Sahara. The sirocco here should be distinguished from the simoom which is much more violent, though both winds produce dust storms.

SISAL, *sis sahl'*, or *sis'al*, or *si'sall*, a tall tropical plant, the swordlike leaves of which yield a valuable fiber used for the making of binding twine, coarse cloth, hammocks, bags, etc. Sisal is native to Yucatan, Mexico, and is also cultivated in limited quantity in Florida, the Bahamas, the West Indies, and parts of Central America. Progreso, the chief port of Yucatan, exports to the United States annually 200,000,000 pounds of this fiber.

Sisal is grown upon stony ground, and its leaves are from two and three feet long. The pulp is cleaned from each side of the leaf and the remaining fiber is then washed and sun-dried.

SISTERS OF CHARITY. See CHARITY, SISTERS OF.

SISTERS OF MERCY. See MERCY, SISTERS OF.

SISTINE, *sis'tin*, or *sis teen'*, **CHAPEL**, the private chapel of the Pope in the Vatican, built for Sixtus IV, in 1473, by Giovanni de Dolci, a Florentine architect. The screen separating the congregation from the section reserved for the Pope and cardinals is one of the foremost pieces of marble decoration of the early Renaissance period. The floor mosaics and frescoes on the walls and ceiling are equally famous. The walls are a museum of works of leading Tuscan and Umbrian painters of the later fifteenth century, with masterpieces of Botticelli, Ghirlandaio, Perugino and many others. Among the ceiling frescoes are Michelangelo's *Creation, History of Noah*, and the celebrated *Prophets and Sibyls*. The entire altar wall is covered by his *Last Judgment*, the largest fresco in the world (see MICHELANGELO).

Most of the functions at which the Pope personally participates take place in the

Sistine Chapel. The Papal elections are also held there.

SISTINE MADONNA. See RAPHAEL; MADONNA; PAINTING.

SISYPHUS, *sis'i fus*, a mythical king of Corinth, who promoted navigation and commerce, and who was so crafty that he even deceived the gods. For his wickedness he was punished in the lower world by being obliged to roll a heavy stone to the top of a hill which always rolled down again, thus rendering his task eternal.

SIT'KA, ALASKA, its former capital, is situated on the west coast of Baranof Island, 1,130 miles north of Seattle and 160 miles southwest of Juneau. The town has a picturesque site, near a number of mountain peaks covered with perpetual snow. The climate is mild, considering the latitude. The chief buildings are the Greek church, begun in 1816; a church connected with the Presbyterian mission, and the school buildings of the Russian-Greek church, the United States government and the Presbyterian industrial training school. Other institutions of importance are the barracks, an agricultural experiment station, the governor's residence, the United States land office and a marine hospital. The chief industries are mining, lumbering and salmon canning. Sitka was the old Russian capital of Alaska and until 1906 was the seat of government for the territory under the United States; in that year the capital was transferred to Juneau. Population, 1920, 1,175.

SITTING BULL (1837-1890), a famous chief of the Sioux tribe of North American Indians, born at Willow Creek, Dakota. From the very first he showed bitter hostility to the white settlers in the Northwest, and was conspicuous in many attacks upon them. At the Battle of Mussel Shell, in the Yellowstone region, in 1868, his forces were defeated, and from this time until 1876 he fought friendly Indians and raided Montana settlements. In 1876 a campaign was undertaken against him, during which General Custer and his force were massacred. Later he escaped to Canada, but on promise of pardon he surrendered to General Miles, in 1881. He again instigated rebellion among the Indians and was killed while resisting a government order for his arrest.

SIUT, or **SIOUT**, *se oot'* (also written ASSIUT), the chief town of Upper Egypt and the capital of the Province of Siut, situated

on the west bank of the Nile, 248 miles south of Cairo, and on the Nile Valley Railroad. It is the official seat of residence of the governor of Upper Egypt. It is a well-built town and trade center. It has manufacturing industries of considerable value and is noted for its red and black pottery and pipe bowls. A large dam has been constructed across the Nile at this point, to regulate the flow of water for irrigation purposes. Near the city are a number of ancient tombs, cut in the rocks. Population, about 42,750.

SIVA, *se'va*, the name of the third of the three great Hindu deities (Brahma, Vishnu and Siva), variously designated as the destroyer and the creator, or regenerator. He is frequently represented with five faces and from two to ten hands; a third eye is in the middle of his forehead. He wears a necklace of human skulls and carries a trident supported by a skull. He has been known by almost a thousand names. See BRAHMA; VISHNU.

SIX NATIONS, THE. See FIVE NATIONS.

SIX'TUS, the name of five Popes, of whom Sixtus IV and Sixtus V were the most noted.

Sixtus IV, who was Pope from 1471 to 1484, was a patron of art and learning. Among the works commemorating his reign are the Ponte Sisto and the famous Sistine Chapel of the Vatican.

Sixtus V was Pope from 1585 to 1590. As Pope he actively pursued criminals and purged Italy of bandits and mendicants. An able financier, he replenished the Papal treasury, which at his accession he had found exhausted, and left at his death three million dollars available to his successor. He also greatly enriched the Vatican library, collecting from the monasteries countless valuable manuscripts and placing them in the hands of competent translators. He built new additions to the library and had the arrangement of books so perfected that it has been since that time the admiration of all students who visit Rome. He founded the Vatican Press and had printed the works of Gregory the Great, Saint Bonaventure and other learned divines; also, the Septuagint and the Vulgate, published in 1590. The Scala Santa, by which, according to tradition, Christ ascended to the hall of Pilate at Jerusalem, was raised by Sixtus's direction. In his brief reign, this pope accomplished more for Rome and the Catholic Church than any of his predecessors in a like period.

SKAGERRAK, *skak'ger rak*, a broad arm of the North Sea, which washes Norway on the north, Jutland on the south and Sweden on the east, where it communicates with the Cattegat (which see). Its length is about

150 miles; its breadth, eighty miles. Its depth varies from thirty to more than 200 fathoms. There are several good harbors on the Norwegian and Swedish coasts. In the Skagerrak, in 1916, was fought a great battle between the British and German fleets (see WORLD WAR).

SKAGWAY, *skag'way*, ALASKA, a subport of entry in the southern district of Alaska, situated on Lynn Canal. It is an important terminus for railroad and steamship lines and is a distributing point of supplies to the interior; through it also pass supplies to and from the Canadian Klondike. It has a public library, three hospitals and a United States government building. Population, 1920, about 500.

SKALDS, or **SCALDS**, *skahldz*, or *skawlds*, poets and historians of the Scandinavian races who flourished from the ninth to the latter half of the thirteenth century. They lived at the courts of princes and sang the praises of their gods and celebrated the exploits of their national heroes. A list of over two hundred of the most distinguished skalds is preserved in the Icelandic language.

SKAT, *skaht*, a game of cards, played with a euchre deck by three, four or five persons, for sixty-one points. The cards in the tricks taken count as follows: ace, eleven; ten spot, ten; king, four; queen, three; knave, two. The four knaves, which are called *matadors*, are the highest trumps and rank in order of suits, clubs, spades, hearts and diamonds. Only three take part in active play at each deal. Five cards are dealt to each of the players. The next two cards are laid face down on the table, then five more are dealt to each of the same players. The two which are laid face down on the table are called the *skat*. Suit must be followed if possible; if not, any card may be played. By means of bidding and passing the bid, in which the rank of the suits is considered, the one who is to lead is selected. The counting is complicated, and the method should be studied from a manual. The game was invented in 1817 in Altenburg and is very popular among Germans. It is played to a considerable extent in the United States, but its difficulty has prevented it from becoming more generally popular.

SKATE, a broad, flat-bodied fish belonging to the ray family, usually found on sandy bottoms near the shore. The chief portion of the body is made up of the expanded pec-

toral fins, which are concealed under the skin. The tail is long and slender; the snout is pointed, with a prominent ridge, or keel. The common skate of the Atlantic coast of North America is a foot or two in length; the barn-door skate is four feet long; and the California skate, the largest of the American species, is six feet long. Most species are edible.



SKATE

SKATES AND SKATING. A skate consists of a steel blade affixed to a wooden or metal base and fastened to the shoe by means of straps, clamps or screws.

The *club skate*, with its rocker-shaped blade, is entirely of metal, and is clamped on the foot; the *Hudson River*, or *Donoghue skate* is straight-bladed, with wooden top and straps; the *Norwegian skate*, ranking as the best, has a blade similar to the Hudson River skate, but is very light in weight and is screwed to the sole of a special skating shoe.

Skating. Skating seems to have been a sport of great antiquity, mention being made of it in the Edda. In Holland, from time immemorial, skates have been used by all classes of people upon the canals and rivers, because of their facility of locomotion. In the United States and Canada few outdoor sports draw such large crowds as skating and most of the northern cities make provision at public expense for skating on the lagoons in the public parks. Local and municipal contests are held for championships. Frequently contests have been held between European, Canadian and American champions. At places of public amusement indoor ice skating is very popular.

SKEAT, *skeet*, WALTER WILLIAM (1835-1912), an English student of languages who wrote nearly fifty books relating to his specialty, nearly all of which have become standard authority on the subjects covered by their titles. Among these are *Etymological Dictionary of the English Language*, *Primer of Classical and English Philology* and *The Science of Etymology*. He was born in London, and educated at Cambridge.



SKEL'ETON, the hard framework that supports and protects the soft tissues of animals. It may lie within these tissues, as with man and the higher animals, or without them, as with turtles, mollusks, etc. The human skeleton is made up of about 200 bones, of which seventy-four belong to the axial skeleton—head, neck and trunk—and about 126 to the appendicular skeleton—the extremities. The number of bones varies a little from infancy to the adult period.

Axial Skeleton. The upper part of the human spine, or vertebral column, is made up of twenty-four separate bones called vertebrae, seven in the neck (cervical), twelve in the chest region (dorsal), and five in the loins (lumbar). To the dorsal vertebrae are attached the ribs, twelve on each side. The ribs are tipped in front with cartilages, which in the seven upper, or true, ribs, join them to the sternum. Of the remaining five, or false, ribs, the upper three are fixed to the cartilages above, but not to the sternum, and the lower two are free, or floating.

They form an easily expanded cavity for the heart and lungs, and as they are easily compressed because of the cartilages, should not be pressed out of position by tight clothing.

The *sternum*, or breast bone, occupies the front of the chest, articulates at its upper extremity with the two clavicles, or collar bones, and gives direct articulation to the seven upper ribs on each side. Below the vertebrae is the *sacrum*, composed of five separate bones in childhood, but growing into a solid structure in the adult. The sacrum forms the keystone of the pelvic girdle, distributing to the pelvis and lower limbs a large part of the bodily weight. At the tip of the spinal column is the *coccyx*, made up in infancy of four bones which become united in adulthood.

Strength, combined with great elasticity and flexibility, is provided for the spinal column by anterior, posterior and lateral ligaments, by pads of cartilage placed between

the vertebrae and by an alternation of anterior and posterior curves in the four principal regions. Hollows through each of the vertebrae form a passage for the spinal cord, and from this central axis branch nerves to all the vital centers. If maladjustment of the vertebrae and spinal curvature occur, there are likely to be serious nerve disturbances and interference with the bodily functions.

Upon the two upper vertebrae, the *atlas* and the *axis*, rests the skull. Hollows in the atlas fit projections on the skull, and the head is thus allowed to move forward and backward. The axis has a peg that projects upward through the atlas, allowing movement of the head from side to side.

The skull is composed of twenty-eight bones, divided into those of the *cranium* and the *face*. The cranial bones encase the brain and are eight in number, namely, occipital, two temporal, two parietal, frontal, ethmoid and sphenoid. They are united by sutures, which somewhat resemble dovetailing in carpentry, thus allowing a symmetrical development or growth at the edges. The bones themselves are made up of two layers, with a porous substance known as the arachnoid membrane lying between. This arrangement gives the cranium power to resist blows and to prevent a jar from being easily communicated to the brain.

The bones of the face, fourteen in number, are the nasal, two superior maxillary, two lachrymal, two malar, two palate, two inferior turbinated, vomer and inferior maxillary bones. The remaining six bones of the skull are the tiny bones of the inner ears.

At the base of the tongue and attached to it is a bone known as the *hyoid*. No fewer than ten muscles arise from or are inserted into it. It articulates with no bones, but is suspended from the skull and supports the larynx by a ligament.

Appendicular Skeleton. This skeleton comprises the shoulder girdle, with the upper extremities (sixty-four bones), and the pelvic girdle, with the lower extremities (sixty-two bones). The *shoulder girdle* includes the clavicle, or collar bone, and the scapula, or shoulder blade. The *clavicle* is a slender bone, shaped like the italic *f*, extending from the sternum to the scapula, and attached to each by cartilage. It prevents the shoulder from falling toward the chest and gives freedom to the shoulder movement. The *scapula*

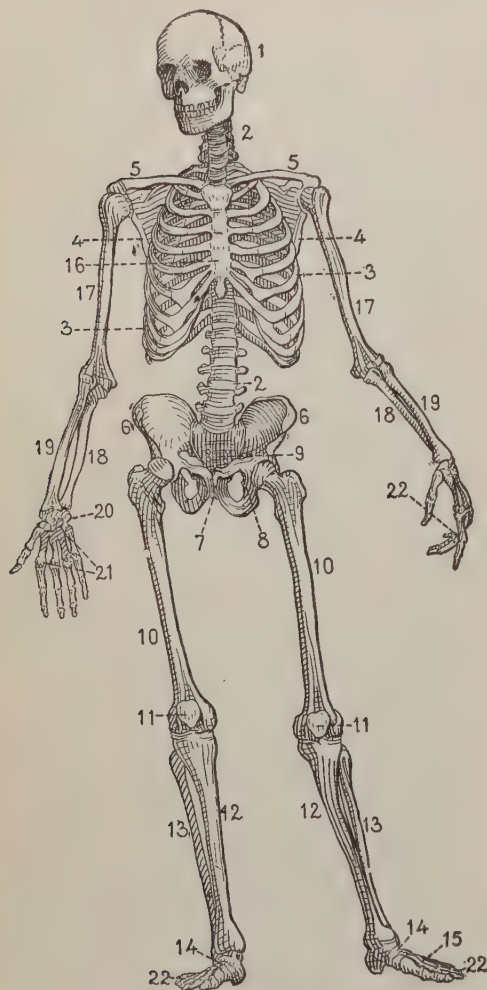
is a flat, irregular, triangular bone, lying outside the ribs, at the back of the chest, but separated and suspended from it by muscles.

The upper extremities include the following bones on each side; the humerus, the forearm,

latter on the inside, each uniting with the humerus by a hinge joint. At their lower extremities the bones of the forearm join the carpus, the radius directly and the ulna indirectly, through the intervention of a small fibro-cartilage. The ulna is heaviest at the end which joins the humerus, and the radius is heaviest at the end which joins the carpus. (3) The *carpus*, or wrist, consists of eight small irregular bones, arranged in two rows, united by ligaments, and lying between the forearm and the palm. (4) The *metacarpus*, or palm, includes the five metacarpal bones, numbered from the thumb to the little finger. The fingers, or *digits*, are provided with three bones each, except the thumb, which has only two. These bones are known as the *phalanges*. The thumb has the advantage of moving freely on the carpus, by means of a saddle joint. The other carpal and metacarpal bones move upon one another by means of gliding joints.

The *pelvic girdle* comprises the innominate, or hip bones, immovably united to the sacrum. Each *innominate* is composed of three bones (ilium, ischium and os pubis), which unite in adult life along a Y-shaped line, located in the cup of the hip joint. The *ilium* spreads out a broad concave surface, in which the intestines are supported; the *ischium*, or haunch bone, forms the projection of the buttock and supports the body while sitting; the *pelvis*, or basin, furnishes the bony support upon which rest the organs of the lower abdominal cavity.

The lower extremities join the innominate bones in the hip joints. They include, on each side, the femur, the patella, the leg and the foot. (1) The *femur*, or thigh bone, is the longest bone in the body; at the upper end of the shaft is a head, a neck, an angle and a large and a small projection; at the lower end are two knobs (external and internal), articulating with the tibia and the fibula in the knee joint. (2) the *patella*, or kneecap, is a chestnut-shaped bone, placed in the tendon of the muscle, at the point where the tendon glides over the external surface of the femur. (3) The *leg* contains two bones, the *tibia*, or shin bone, and the *fibula*. The tibia is the larger bone and articulates with the femur. At the lower extremity is a horizontal, smooth surface, for articulation with the ankle. The fibula is a slender bone, located on the outside of the leg, covered entirely by muscles, except at



THE SKELETON

1. Cranium. 2. Vertebrae. 3. Ribs. 4. Scapula or shoulder blade. 5. Clavicle or collar bone. 6. Hip bone. 7. Coccyx. 8. Pubes. 9. Sacrum. 10. Femur or thigh bone. 11. Patella or kneecap. 12. Tibia. 13. Fibula. 14. Metatarsal bones. 15. Phalanges. 16. Sternum. 17. Humerus. 18. Ulna. 19. Radius. 20. Phalanges. 21. Metacarpal bones.

the carpus and the metacarpus. (1) At the upper extremity of the *humerus*, or arm bone, are found a head, a neck and two projections, while at its lower extremity it articulates with the ulna and radius. (2) The *forearm* is made up of the *radius* and the *ulna*, the former on the outside and the

its upper and lower extremities. It articulates above and below with the tibia. (4) The *foot* is made up of a series of bones, arranged in three groups—the *tarsus*, or ankle, made up of seven bones; the *metatarsus*, made up of five metatarsal bones, and five digits, in each of which are found three bones, except in the great toe, which contains only two.

The articulation of the bony parts into a symmetrical, graceful whole, capable of united movement, is one of the marvels of nature. Every mechanical device known to man has its prototype in the bodily structure. See JOINTS.

SKEPTICISM, *skep'te siz'm*, a term in philosophy applied to a trend of reasoning in which the predominant attitude is doubt. Notable among the skeptics of the ancient world were Gorgias, Protagoras, Pyrrho and Timon. With the Renaissance the influence of this philosophy is apparent in the writings of Montaigne, Sanchez and Charron. Kant and Spencer were skeptics with regard to ultimate reality. In David Hume, modern skepticism had its foremost adherent.

SKI, *ske*, or **SKEE**, the Scandinavian snowshoe, consisting of a runner, or slat, of wood, six to ten feet long, about one-fourth of an inch thick and a little broader than a man's foot. It is slightly curved upward at the tip, and sometimes has a narrow groove along the middle of the lower surface, to keep it from slipping sideways. Skiing is great sport, and in Norway, Canada and the United States clubs compete every winter. In walking uphill a zigzag course is followed; the downhill motion is a swift slide, steered by means of a shaft. A jump is made on a hillside and is really a long flight through the air, from which the jumper is expected to alight on his feet and continue his course without falling. The infantry of Sweden and Norway is equipped with skis for long marches.

SKIMMER. See SCISSORSBILL.

SKIN, *THE*, the outer covering of the body. It has a total area of from twelve to twenty square feet and varies in thickness from one-eighth to one-hundredth of an inch, according to location.

Structure. The skin is composed of two layers. The outer, the *epidermis*, or *cuticle*, is itself made up of several layers of cells of various shapes and sizes. The surface layer is composed of horny scales and is thick-

ened on the palms of the hands and on the soles of the feet. The inmost layer of the cuticle seldom varies in thickness, and it fits closely to the true skin. It contains the coloring matter which gives the characteristic tint to individuals and races. There is at all times a continual building of new cells and a throwing off of old ones from the surface. The hair and nails are a modification of the cuticle.

The true skin, the *dermis*, or *cutis*, in its outer layer contains many minute projections, called *papillae*, upon which the inmost layer of the cuticle is molded. They are most abundant where the sense of touch is most acute, as they contain nerve fibers.

Glands. The skin also contains the *sudoriferous*, or sweat, glands, and the *sebaceous glands*. The former, consisting of small, round masses, surrounded by blood vessels in the fat tissue under the skin, send up a duct through the cutis to the surface of the body, where it pours its secretion through a slanting, valvelike opening. These glands are distributed over the whole surface of the body, but are most abundant and largest in the palm of the hand, on the sole of the foot, and on the brow. Sebaceous glands, abundant in those parts of the body supplied with hair and about the entrances to the body, as the nose, the lips and the external ear, are wholly wanting in the palms of the hands and the soles of the feet. Their secretion keeps the skin soft and pliable.

The skin serves as an organ of touch; a regulator of temperature, by the evaporation of the sweat that is always being poured to the surface of the body; a protection for the deeper tissues, and an organ of excretion, secretion and absorption.

Related Articles. Consult the following titles for additional information:

Baths	Nails
Glands	Nervous System
Hair	Perspiration
Hygiene	

SKIN GRAFTING, or **AUTOPLASTY**, *aw'toh plas ti*, a surgical operation sometimes used in the treatment of sores or ulcers that are slow in healing. Small pieces of healthy skin, cut from other parts of the patient's body, or from the body of another person, are placed upon the raw sore. The skin particles gradually grow over the unhealed surface, in time effecting a cure.

SKINK, a small lizard native to the sandy deserts of North Africa and Southwestern Asia. Skinks are from six to eight inches

long, are reddish in color, banded with darker shades, and their bodies are entirely covered with rounded scales. One species, the *adda*, is celebrated throughout the East as being useful in the cure of various diseases to which the inhabitants of Egypt, Arabia and other Eastern countries are subject.

SKINNER, *skin'er*, OTIS (1858-), an American actor famed as an interpreter of character and romantic rôles wherein buoyancy and flashes of humor are blended. He was born at Cambridge, Mass. His early training was gained under the tutelage of Edwin Booth and Lawrence Barrett. From 1884 to 1889 he was a member of the Augustin Daly company and later for several seasons appeared as leading man for Modjeska. His most recent successes have included *The Harvester*, *Kismet*, *Cock o' the Walk*, *Mr. Antonio*, and *Sancho Panza*.

SKUA, *sku'a*, a powerful bird of prey of the gull family, living on northern seacoasts, and having brown and white plumage and a strong, hooked beak. The Arctic and Antarctic species attack terns and small gulls, taking from them the fish they have caught; they also devour smaller birds.

SKULL. See SKELETON.

SKUNK, a fur-bearing animal of the weasel family, found from Northern Canada to Patagonia in the American continents. The



SKUNK

animal is about the size of a large cat, has feet and claws like a badger's and a tail like a squirrel's. The fur is brown, streaked longitudinally with black and white. Skunks are notorious for a malodorous fluid which they eject as a means of defense, driving away their most aggressive enemies. They are sluggish ground animals, living in burrows and prowling usually at night, but occasionally in the daytime. They sometimes raid poultry yards, but so great is their service to the farmer as destroyers of mice, snakes and harmful insects and grubs that more than a dozen states have passed laws to protect

them. They are also valuable as producers of fur, which is often sold under the name "Alaska sable."

SKYE, *ski*, ISLE OF, an island of the Hebrides group, off the west coast of Scotland, forming part of the County of Inverness. It is the second in size of the Scottish islands, having an area of 535 square miles. Although it has some tillable land, Skye is largely mountain and moor, a land of rugged scenery and weird legend. Some of its lochs and glens are famous for picturesqueness—Loch Coiruisg, immortalized by Sir Walter Scott in his *Lord of the Isles*, and Glen Sligachan, at the head of the loch of the same name. The highest mountains are the Coolin Hills, in the south. The coasts of the island are deeply indented and the waters abound in cod, herring, ling and saithe. A fringe of fishing villages lines the coasts. Sheep raising is the chief occupation of the farmers, and much wool and sheep as well as fish goes through Portree, the principal port, which has a population of about 3,000, about one-fifth of the entire population of the island. To many persons the name *skye* is chiefly identified with a popular breed of pet dogs which are native to the island.

SKYE TERRIER, *ski ter'ier*, a small terrier native to Scotland, taking its name from the Isle of Skye. It is from eight to ten inches high, and has a long body and short legs. The hair, which may be sand-colored, gray or black, reaches to the ground, and on the forehead completely covers the eyes. The skyes, like most other terriers, are good rat dogs.

SKYLARK. See LARK.

SLAG, a compound formed in the processes of extracting metals from their ores. It is mainly a compound of silica with alumina or lime, or both, together with various other substances in small quantity. It always contains more or less of the metal from the extraction of which it results. The presence of silica gives a glassy appearance to the mass. Slag is sometimes cast into blocks and used for road making and building, and when reduced to powder it is used in making mortar. In some parts of Europe slag is employed to impart a glaze to bricks. Some kinds of iron slag are made into an imperfect glass, which is used for vases and other small articles.

SLANDER, false and malicious oral defamation of a person, which has a tendency

to injure his reputation. It is distinguished from *libel*, which is written or printed defamation of character. Aspersions spoken to a person are not deemed slander, because they are not injurious to reputation; but when spoken in the hearing of a third person, the law holds them actionable. If the words spoken are true and justifiable, no action can be successful. A statement which is not in itself actionable may by the court be held to be so if it was used and understood in a particular derogatory sense. An accusation of perjury is always actionable. Certain kinds of communication are regarded as conditionally privileged, as in the case of an employer who communicates to one who has a right to know particulars regarding one of his former employes. However, exemption from liability in such a case does not imply a right to express malicious slanderous opinions.

SLANG, inelegant and unauthorized language, including sporting and trade jargon, standard expressions used with some other than their correct meaning, and words of dubious origin. While certain slang expressions may be traced to the speech of illiterate or even outlaw classes, others are used by educated persons for the purpose of giving force and piquancy to their language. Slang is not ordinarily used in dignified writing, but it is common in a certain type of humorous literature. The everyday speech of the average person is more or less tinged with slang. The university student "crams" for his final examinations; the football enthusiast speaks of "booting the pigskin;" the actor about to receive his pay check is waiting for the "ghost to walk;" the artist complains that the committee "skied" his picture, and so on. In many cases slang is based on comparison, that is, on metaphor. Such expressions as "to cash in," "to go fifty-fifty," "to bring home the bacon," are really vulgarized forms of speech.

Like many other irregularities in language, slang expressions have their good and their bad points. They are an inevitable part of the growth of a language, and it often happens that a word introduced as slang becomes in time standardized. Such, for example, is true of *skyscraper*, *tandem*, *blizzard* and *gerrymander*. As has been suggested, slang sometimes gives variety and force to language, in the same way that figurative expressions are useful. Slang expressions,

however, must always be used with discretion. Vulgarities of speech should be avoided, and one should be careful about overloading the speech with slang phrases, no matter how expressive. The habitual and indiscriminate use of these expressions tends to cheapen the conversation, limit the vocabulary and deaden one's taste for the language of culture.

SLATE, a well-known hard variety of rock, which splits into thin plates, used for making school blackboards and slates and for roofing. While the prevailing color is gray of various shades, slate may be green, purple, red or black. It yields to the knife, but the different varieties vary in hardness. Slate occurs in all countries where there are metamorphic rocks. It is commonly divided into elevated beds of various degrees of thickness; and from the natural divisions of the rock these beds often form peaked and serrated mountains. The finest variety, which is used for the covering of roofs, is generally embedded in other slate rocks, of a coarser kind. Quarries of slate of this description are worked extensively in Vermont and Pennsylvania, and on a smaller scale in Maine and Virginia. The finest grades are used for writing slates and blackboards. In the making of marbleized slate, the background is painted on the stone, which is allowed to dry and is then dipped into water, upon which coloring matter has been spread. The coloring matter adheres to the slate and thus produces the pattern, which is fixed by baking the slabs in a kiln.

SLAVERY, the system by which persons are held as the property of others. Slavery existed among the Hebrews, but in a very restricted form. Among the Greeks and Romans it was a rooted institution, its character of mildness or severity varying in different times and places. The slaves of the ancient Romans were either captives or debtors unable to pay. Originally they had no rights at all, and could be put to death for the smallest misdemeanor. Slaves were exceedingly numerous, and in later times almost monopolized the handicrafts and occupations, those of clerk, doctor and literary man included. Hosts of slaves were employed in the gladiatorial exhibitions. In Rome slaves were often set at liberty, and they sometimes won renown, as in the cases of Terence and Epictetus, but it was not until the time of the Empire that any important change took place

in the institution itself. Emperor Augustus granted the slave a legal status, and Antoninus took from the masters the power of life and death over their slaves.

The rise of Christianity modified the rigid chattel conception of the slave, and, accordingly, the law soon gave him personality and protection. Finally, Justinian, in the sixth century A. D., enlarged the *coloni*, men personally free, but tied to the soil like serfs. Thereafter slavery, though practiced by Rome's Teuton conquerors, was gradually replaced in medieval Europe by feudal vassalage, or serfdom. This persisted to modern times, surviving in Russia until 1861.

Modern Revival of the Slave Traffic. After the institution had become all but extinct in Europe, it had a new birth in the American colonies of European origin. The first shipment of negroes to the New World took place in 1503, when the Portuguese carried some to Santo Domingo. From that time a traffic in negroes across the Atlantic was carried on by all the colonial powers, the English being particularly active.

Slavery soon affected the social, economic, and political character of the colonies, especially in the South, where it was found profitable, to such an extent that in spite of the theory of equality then in vogue, abolition was deemed unwise and unnecessary by the majority of the people.

Denmark was the first nation to decree the end of the slave trade, in 1792, although the movement was started by the American Quakers in 1696 and their English brethren in 1729. Through the efforts of Thomas Clarkson and William Wilberforce, the House of Commons passed a bill against the traffic in 1792, but the House of Lords did not approve the measure until 1808, in the same month that the United States legislated against the further importation of Africans. On February 4, 1794, the French National Convention declared all the slaves in the French colonies free. The abolition of the slave trade by most of the other European powers was gradually provided for by treaty. These treaties were mainly enforced by a British squadron maintained off the west coast of Africa. In 1831 the British government emancipated all the slaves of the Crown, and in 1833 a bill was passed for the emancipation of all the slaves in British colonies. By this bill the slaves were to receive their freedom on August 1, 1834, and the sum of

\$100,000,000 was to be distributed as a gift among the slaveholders, to compensate for any loss they might sustain by the arrangement.

The United States Constitution provided for the abolition of the slave trade in 1808, but a struggle was waged against slavery itself for a half-century thereafter. It culminated in the Civil War, as a result of which abolition was declared by proclamation in 1863 and by Constitutional amendment in 1865. In 1873 the Spanish government abolished slavery in Porto Rico; and in 1886 abolition in Cuba took place. Slavery existed in Brazil until 1888. The efforts made to suppress the slave trade on the east coast of Africa have not proved quite successful and a trade is still being carried on in Africa, although not on an extensive scale.

Related Articles. Consult the following titles for additional information:

Abolitionists	Kansas-Nebraska
Brown, John	Bill
Calhoun, John C.	Lincoln, Abraham
Civil War	Mason and Dixon's
Clay, Henry	Line
Compromise of 1850	Missouri Compromise
Crittenden Compromise	Phillips, Wendell
	Political Parties in
Dred Scott Decision	the United States
Emancipation	Reconstruction
Proclamation	Squatter Sovereignty
Feudal System	Serfs
Fugitive Slave Laws	Underground Railroad
Garrison, William	Wilberforce, William
Lloyd	Wilmot Proviso

SLAVONIA. See CROATIA AND SLAVONIA.

SLAVS, *slavvz*, a branch of the Aryan, or Indo-Germanic, family, constituting the greater portion of the population of Russia, Central Europe east of Germany, and Siberia. They include Russians, Poles, Czechs, or Bohemians, Slovaks, Slovenians, Serbs, Croats, Montenegrins and Bulgarians, and number about 180,000,000. In stature the Slavs are a little below the average Aryan, and they have broad heads. Their skin is swarthy, light brown or pale white; their eyes, brown, gray or black. Representing a civilization not advanced to full maturity, the Slavs were stirred to great revolutionary upheavals during the World War. In Russia the imperial government was overthrown, and an attempt was made to establish a communistic republic. In the Slavic portions of the Austro-Hungarian monarchy two independent states were erected, the Czecho-Slovak (Bohemian, Moravian, Slovak), and the Jugo-Slavic, or Southern Slavic.

Related Articles. Consult the following titles for additional information:

Austria-Hungary	Bohemia
Balkan Wars	Bosnia

Bulgaria	Poland
Croatia and Slavonia	Russia
Czech	Serbia
Czecho-Slovak	Slovaks
Republic	Slovenians
Jugo-Slavia	World War
Montenegro	

SLEEP, the state of repose or quiescence during which the body restores its worn-out cells and the mind is rested and renewed. Unconsciousness is complete or partial; the body is relaxed and the vital functions are at a low ebb. Sleep is periodical, a certain number of hours out of each twenty-four being necessary to physical and mental well-being. Night hours are best adapted to sleep, and daytime sleep is never as refreshing as that taken in the natural darkness. Sleep is also rhythmical, being deepest the second hour and becoming lighter as the end of the sleep period approaches.

Much study has been put upon the physiological causes of sleep, different theories attributing it (1) to the pressure of congestion on the brain and nerve centers, or quite to the contrary; (2) to a lack of blood in these centers; (3) to the presence in the system of the by-products of combustion and (4) to the dissociation, under conditions of fatigue, of the neurones, or nerve cells. None of these theories entirely accounts for sleep, and it is probably true that it has a combination of physiological causes.

The regularity and conditions of sleep have a marked effect on the health, especially on that of growing children. Babies sleep most of the time; children below twelve should have twelve hours of sleep; few adults are at their best on fewer than eight hours. Sleeping rooms should be sanitary, open to the sunlight during the day and well ventilated at night. Open-air sleeping is growing in favor, and the sheltered, screened-in sleeping porch forms a part of many modern houses and living apartments. The best bed for sleep is one with wire springs, a mattress of hair or felt, and warm, lightweight wool or cotton coverings.

SLEEPING SICKNESS, an incurable disease not uncommon in equatorial Africa. It is caused by a parasite communicated to man by the bite of the tsetse fly (which see). It is always fatal. In recent years whole sections in Africa have been depopulated by its ravages. The sleeping sickness stage begins when the disease reaches the nervous system. The patient becomes apathetic, the apathy deepens into stupor, and he literally sleeps himself to death.

SLEEPWALKING. See SOMNAMBULISM.

SLIDELL, *sli del'*, JOHN (1793-1871), an American politician, born in New York City and educated at Columbia College. He removed to New Orleans in 1819, and eventually became United States district attorney for Louisiana. In 1853 he was elected to the United States Senate, but resigned upon the secession of Louisiana. Later he was appointed special commissioner of the Confederate States to France and ran the blockade of Charleston, S. C. He was captured with James M. Mason, however, while aboard the British steamer *Trent*, and was arrested and taken to Fort Warren, Boston. Upon his release he sailed for England, where he took up his interrupted negotiations with foreign governments, but without success. At the close of the war he settled in London, where he died. See TRENT AFFAIR.

SLIME MOLDS, a group of minute plants of exceedingly simple structure, which live upon rotting bark and decaying wood, in moist, shady places. They are not easily distinguished from animals; in fact, they have been thus described. In no other plant is protoplasm found in such large quantity. During one period of its life the slime mold develops spores which, when dry, retain life for an indefinite period; but as soon as moistened, they swell quickly, burst and discharge their protoplasm. This protoplasm lengthens and develops a delicate hair at one end, by means of which it swims about freely. The form modifies until it resembles an amoeba (which see). Then many of the plants unite and make the slimy plasmodium, which slides about over decaying vegetable matter until ready again to produce spores and repeat the circle of its life. The largest plasmodia may be several inches square, although most of them are much smaller.

SLING, a simple little device of very ancient origin, used for throwing stones or bullets. One kind consists of a strap, with two strings attached to it. The stone or bullet is lodged in the strap, and the sling is whirled rapidly round in a circle, the ends of the strings being held in the hand. The missile is thrown when one of the strings is allowed to fly loose. The velocity with which the projectile is discharged is the same as that with which it is whirled round in a circle whose radius is the length of the string. The sling was a very general instrument of war among the ancients.

Another kind consists of a Y-shaped stick, to each fork of which is attached an end of a thick rubber band. The stick is held in one hand, and with the other a stone is held against the elastic, which when stretched backward and then released throws the stone with much force. The catapult, or slingshot, may be a dangerous weapon, and in most cities boys are forbidden to use it. A sling used by the Paraguay Indians, the Patagonians and the Gauchos of Argentina, called a *balas*, consists of a rope which has, at each end, a heavy stone, or bullet, of metal or hardened clay. It is thrown so as to entangle the legs of the animal at which it is aimed.

SLIPPERWORT. See CALCEOLARIA.

SLOE, *slo*, a spiny, many-branched shrub or small tree of the plum family, possessing a very hard, tough wood, found in Europe and Asia, on the mountains in the southern and eastern parts of the United States and in South-eastern Canada. Its black, round fruit, about the size of a pea, is used for preserves and liquors. The juice is much used in the manufacture of a spurious port wine.



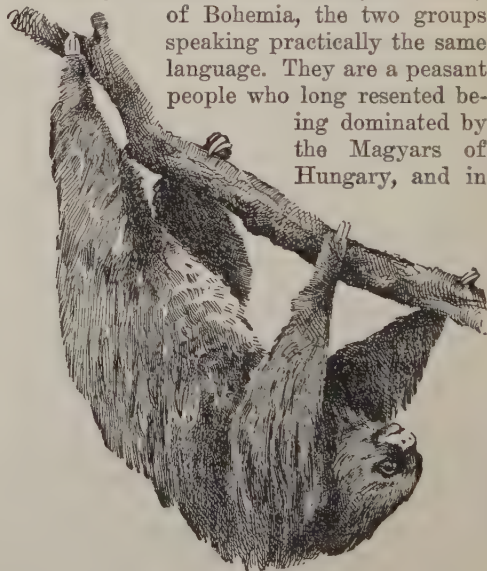
SLOE BRANCH AND FRUIT

SLOTH, a mammal inhabiting South and Central America. The claws of the sloth are long and curved, the feet are turned inward. This adaptation is of great service to the animal in its life in the trees, but it makes walking on the ground almost impossible. The sloths live on the leaves, buds, and barks of trees. The best known species is the *ai*, which has three toes and is of a brownish-gray color, with darker tints on the face and limbs. The fur is very coarse. The *unau*, or two-toed sloth, has an average length of about two feet, and its color is a lighter gray than that of the *ai*. The tail in both species is usually lacking, or is of a rudimentary character.

SLOT MACHINE, the name given to two kinds of automatic devices, one of which is used for legitimate purposes of trade, the other for gambling. They are alike only in that the mechanism in each is set in motion by a coin dropped in a slot. The first is a sort of "automatic salesman." It may contain an assortment of chewing gum, candy, peanuts or cigars, the name of the brands or flavors being indicated above a series of levers; and the purchaser after dropping his coin presses the lever according to his choice. Another slot machine is used to release gas for household use; still another supplies telephone service. In 1916 automatic restaurants were opened; these serve food enclosed in little wall compartments behind small doors operating on the slot machine principle.

The slot machine used in gambling consists of a wheel divided radially into sections. The bettor stakes on a particular section and drops in his coin, which starts the wheel revolving. If the wheel stops with pointer indicating the section on which he has staked, he wins. The chances against winning are at least 60 to 40, and very frequently less.

SLOVAKS, a Slavic people found chiefly in Moravia and Slovakia, former territories of the Austro-Hungarian monarchy. The Slovaks, who number more than 2,500,000, are closely related to the Czechs (see CZECH) of Bohemia, the two groups speaking practically the same language. They are a peasant people who long resented being dominated by the Magyars of Hungary, and in



SLOTH

1918 they joined their kinsmen in Bohemia in setting up the Czecho-Slovak Republic.

SLOVENIANS, *slo ve'ni anz*, a South Slavic people inhabiting portions of the old Austro-Hungarian monarchy. They are found in Carniola, Southern Carinthia, Styria and various districts north of the Adriatic Sea. They number over 1,500,000. The Slovenians constitute one group of the Jugo-Slavic peoples, who united in 1918 to form a new state. See JUGO-SLAVIA; WORLD WAR.

SLOYD, *sloid*, a system of manual training, originating in Sweden and quite generally adopted in other countries. The Swedish word *slog*, in its English form *sloyd*, means *skill of hand*. The original plan limited the work to the manufacture, by whittling, of small household utensils, such as wooden spoons, knives and forks. In 1876, Otto Solomon, director of the normal school at Naas, extended the system by the introduction of mechanical drawing, extended the use of tools, and adapted more difficult exercises.

The system in vogue in the United States and Canada is patterned after Solomon's idea and constitutes the foundation of most of the manual training work for boys in elementary schools. The material used is wood, cardboard or iron. A special line of instruction is prepared for each class of material. See MANUAL TRAINING.

SLUG, the name applied to several genera of mollusks, resembling the snails but lacking an external shell, although many of them possess a rudimentary organ of this nature concealed more or less completely by the mantle. The slugs have four tentacles, and the eyes are borne on the tips of the larger pair. The *great gray slug*, introduced from Europe into the United States and Canada, usually frequents hollow trees and undisturbed heaps of vegetation. The *giant yellow slug* of California and the *black slug* are other species. See SNAIL.

SMALLPOX, or **VARIO'LA**, an acute, infectious disease, characterized by an eruption with papular, vesicular and pustular stages, followed by crusting. It has been known and described since the early Middle Ages, and at times has been one of the most terrible of scourges. No infant is too young to take the disease, and no adult is too aged. The contagion lies in the sores, or *pustules*, and it is also probably given off through the breath and the pores of the skin. The disease manifests itself about twelve days after

exposure and varies in duration according to the severity of the attack. In minor cases the recovery is rapid and complete, but in severe cases death may intervene quickly. Unless great care is exercised during the disease and after, the patient may be left with bad scars or with serious affection of some of the organs, particularly of the eyes.

In 1780 the English surgeon, Jenner, discovered the method of preventing smallpox by vaccination and since that time it has been demonstrated that the disease may be practically stamped out by the vaccination of the whole population. Exposure to the disease should be followed by immediate vaccination, unless this has been recently done. See VACCINATION.

SMELL. The sense of smell originates in the olfactory lobes of the brain, and the olfactory nerves coming from these centers are distributed to the mucous membrane of the upper part of the nasal cavities. In order that odors may be detected, air must pass through the nostrils; hence a person sniffs when he desires to scent an odor more keenly. The sense of smell in man is not nearly so keen as in many of the lower animals, though he can probably detect more odors than any of these animals.

Odors are numerous and difficult to classify, and they are named from the substance from which they arise, as the odor of musk and the perfume of violets. The nerves of smell are stimulated by an odor when it first acts upon them, but if long continued, this is lost, and the person fails to recognize it at all.

The nature of odor is not well understood. That it arises from gaseous or volatile matter all agree, and some authorities consider that it can arise from matter in a gaseous state alone; others disagree, and in support of their theory point to the fact that substances like musk can fill a large space with odor for weeks and not diminish perceptibly in weight. The sense of smell is closely allied to the sense of taste, which it undoubtedly aids.

Related Articles. Consult the following titles for additional information:
 Nose
 Perfumes
 Special Senses
 Taste

SMELLING SALTS, a preparation of ammonium carbonate, usually scented with lavender, sometimes with bergamot, used as a stimulant and restorative in cases of faintness. It is put up in small, fancy bottles

which may easily be carried in a pocket or handbag, and proves most useful in emergencies.

SMELT, a family of fishes allied to the salmon. They are slender and delicate and usually measure about eight inches in length. They receive their name because of their odor, which is like that of a cucumber. Smelts live off the coasts of Europe and North America. In the United States they abound along the New England and the California coasts. In Scotland they are called *sparling*. Their use as food is steadily growing.

SMETANA, *sme tah'nah*, FRIEDRICH (1824-1884) a Bohemian composer and pianist, the founder of the Bohemian school of composition. He founded a musical academy at Prague, after studying under Liszt, but went to Sweden in 1856 and became conductor of the Gothenburg Philharmonic concerts. There he remained until 1866, when he became kapellmeister at the National Bohemian Theatre. In his later years, his mind gave way, and he died in the Prague lunatic asylum. Smetana's works have a true Bohemian atmosphere; they are thoroughly original and contain not a few passages of striking power and beauty. He composed several operas, *The Bartered Bride*, *Two Widows*, *Dalibor* and others, besides many compositions for the piano and orchestra.

SMILAX, a group of plants belonging to the lily family. Most of them are climbing or trailing, and numerous species are found in Asia and America. Sarsaparilla is obtained from the roots of several species, and the roots of others are edible. The species known as green brier and the carrion flower are found in the United States. The cultivated plant known to gardeners as smilax is really an asparagus.

SMILES, SAMUEL (1812-1904), an English writer, born at Haddington, Scotland, and educated for the medical profession. He practiced for some time as a surgeon at Haddington and at Leeds, and then became editor of the *Leeds Times*. He is the author of many works on industrial enterprises, the chief of which are *Life of George Stephenson*, *Workmen's Earnings, Strikes and Wages* and *Lives of the Engineers*. His inspirational books, *Self-Help*, *Character, Duty and Thrift*, have had a wide popularity, the first especially, having been translated into seventeen languages. These works are characterized by their clear and simple style.

SMITH, ADAM (1723-1790), a British economist, founder of the science of political economy, was born at Kirkealdy, Scotland. He attended the universities of Glasgow and Oxford, afterwards lectured on literature and philosophy, and for twelve years occupied the chair of logic and ethics at the University of Glasgow. His great work, *The Wealth of Nations*, the first systematic treatise on economics, appeared in 1776. This admirable book, based on statistics and original research rather than on speculation, set a new standard for publications in this field; and in encouraging investigation along similar lines it was an inspiration to all later students of economic subjects.

SMITH, EDMUND KIRBY (1824-1893), an American soldier, born at Saint Augustine, Fla., and educated at West Point. He served in the Mexican War with distinction and later became an instructor at West Point. At the opening of the Civil War he resigned from the United States army and became brigadier-general in the Confederate service, serving with Johnston in the Shenandoah Valley in 1861 and under Bragg in the west in the following year. In October, 1862, he was made lieutenant-general and was given charge of all the Confederate forces west of the Mississippi. In February, 1864, he was made general and opposed General Banks in the disastrous expedition up the Red River. He finally surrendered to General Canby, in May, 1865. After the war he became interested in commercial enterprises, was chancellor of the University of Nashville from 1870 to 1875 and later professor in the University of the South at Sewanee, Tenn.

SMITH, FRANCIS HOPKINSON (1838-1915), an American engineer, artist and author, born at Baltimore, Md. In his work as engineer he became also a successful contractor and constructed several important government works on the Atlantic seaboard, among them the Race Rock lighthouse. As an artist he became known through illustrations he made for his magazine articles and his water colors and charcoal sketches. His pictures have been given place in numerous large public collections. He wrote a number of novels, probably the best of which is *Colonel Carter of Cartersville*. Among his other books are *Caleb West*, *A White Umbrella in Mexico*, *the Fortunes of Oliver Horn*, *The Under Dog*, *Tides of Barnegat*, *Peter*, *Forty Minutes Late* and *Kennedy Square*.

SMITH, GOLDWIN (1823-1910), an eminent publicist, historian and educator, born at Reading, Berkshire, England. He was educated at Eton

and at Oxford (was called to the bar, though he never practiced), and became professor of modern history at the latter university. He lectured in the United States in 1864, and two years afterwards was offered a professorship in Eng-



GOLDWIN SMITH

lish and constitutional history at Cornell University. He remained there three years, then became a resident of Toronto, Ont., where he founded *The Canadian Monthly*, *The Nation* and *The Week*. Smith was widely read because of his sound knowledge and lucid style. Of his historical writings, representative volumes are *A Short History of England Down to the Reformation* and *Irish History and the Irish Question*. His other writings, which were numerous and covered a wide field, include *Labor and Capital*, *Guesses at the Riddle of Existence*, *My Memory of Gladstone* and *In Quest of Light*.

SMITH, JOHN (1580-1631), commonly known as Captain John Smith, one of the founders of the English colony in Virginia, born at Willoughby, in Lincolnshire. After many adventures as a soldier of fortune in Europe, Asia and Africa, he went out with the first expedition of the London Company to America in 1606. Dissensions broke out before the destination was reached, and Smith was condemned to be hanged; but he escaped this fate and became the most influential member of the colony. He made important geographical discoveries, obtained supplies from the natives and finally was entrusted with the guidance of the colony. In this task he displayed notable executive ability. In 1609, according to his account, he was captured by Powhatan, and was saved by Pocahontas from being killed. In the same year he was injured by an explosion of gunpowder, and shortly afterwards he returned to England. Five years later he reached America again and explored the coast of New England. He wrote *A True Relation of Virginia*, *The*

Summer Isles and *Description of New England*—books of real historical and geographical value.

SMITH, JOSEPH (1805-1844), the founder of the Church of the Latter Day Saints, or the Mormons, was born in Sharon, Vt. He moved with his parents to Palmyra, N. Y., when he was ten years old. At the age of twenty-two he announced that in a vision an angel had revealed to him the spot where the Bible of the western continent was buried. Following the directions thus obtained, Smith claimed that there was delivered to him the volume



JOSEPH SMITH

containing the doctrine on which Mormonism is founded. The new sect met with persecution and the Mormons were gradually driven westward. In 1844 Smith was arrested for alleged violations of the law, and lodged in jail at Carthage, Ill., where he was shot by a mob. See MORMONS.

SMITH, SAMUEL FRANCIS (1809-1895), an American preacher and hymn writer, best known as the author of the national anthem beginning, "My Country, 'Tis of Thee." He was born in Boston, Mass., and was graduated from Harvard College in 1829 and from Andover Theological Seminary in 1832. He was pastor of the Baptist Church, Waterville, Mo., and subsequently became professor of modern languages in Waterville College. Later he was pastor at Newton, Mass.; editor of the *Christian Review*, Boston, and editor of the publications of the Baptist Missionary Union (1854-1869). He wrote, in addition to poems, *Life of Rev. Joseph Grafton*, *Missionary Sketches*, *A History of Newton* (Mass.) and *Rambles on Mission Fields*. See AMERICA.

SMITH, SYDNEY (1771-1845), an English humorist, born at Woodford, Essex. He was graduated at New College, Oxford, and was ordained in the established church. Moving to Edinburgh in 1798, he helped to found the *Edinburgh Review*, to which he made frequent contributions in later years. In 1803 he moved to London, where he gained note as a preacher, writer and lectur-

er. He was gradually promoted in the church, until in 1831 he was appointed a canon in Saint Paul's Cathedral. His principal writings are his *Letters on the Subject of the Catholics, to My Brother Abraham, who Lives in the Country*, by Peter Plymley, a satirical essay in the interests of Catholic emancipation. These and other less famous writings abound in logic and good humor.

SMITH COLLEGE, an institution for the higher education of women, founded by Miss Sophia Smith at Northampton, Mass. It was chartered in 1871 and class sessions began in 1875. All undergraduate courses of study lead to the degree of Bachelor of Arts. The degree of Master of Arts is conferred for postgraduate work. Among the college buildings are the library, containing over 60,000 books, an observatory, a conservatory, an art gallery and a spacious auditorium. The faculty numbers about 185, and there are over 1,950 students. The college is a contributor to the American Schools of Classical Study at Rome and Athens, to the marine biological laboratory at Woods Hole, Mass., and to the zoölogical station at Naples.

SMITH-HUGHES ACT. See HIGH SCHOOL, subhead *Smith-Hughes Act*.

SMITH'S FALLS, ONT., in Lanark County, on the Rideau Canal and the Canadian Pacific and Canadian National railroads, forty-five miles south of Ottawa. A large agricultural implement factory is located here; there are also stove factories, woolen, flour and planing mills. The town has a collegiate institute, two hospitals, a town hall, a library and a market. Population in 1921, 6,790.

SMITHSONIAN INSTITUTION, an institution created by an act of Congress in 1846, to carry into effect the provisions of the will of James Smithson, an Englishman, who, in 1826, bequeathed \$515,000 to the United States to found at Washington an establishment for the "increase and diffusion of knowledge among men." The institution is governed by a board of regents, consisting of the Vice-President of the United States, the Chief Justice of the Supreme Court, three members of the Senate, three members of the House of Representatives and six citizens of the United States appointed by joint resolution of Congress. Its executive officer is the secretary, chosen by the regents.

The first secretary, Professor Joseph Henry, outlined the scope and administrative

policy of the Institution, and to his wisdom and foresight the efficiency of the institution is largely due. The aim is to encourage original research in science and literature and to diffuse knowledge by publishing reports of investigations, thereby helping to bring about a free interchange of ideas among scholars throughout the world. To the original bequest of Smithson have been added other donations and bequests; the total income is now approximately \$1,000,000.

The first series of publications systematically issued are *Contributions to Knowledge*, *Miscellaneous Collections* and *Annual Reports*. These are distributed free of charge to public libraries, educational institutions and individuals engaged in literary or scientific research. In connection with this distribution the Institution has established a system of international exchanges, so that it obtains similar publications from nearly all countries of the world.

In addition to the work of the Institution proper, the secretary has charge of the National Museum, which is maintained by the government; also of the Bureau of Ethnology, which is a department in the Institution, of the Astrophysical Observatory and of the National Zoölogical Park. The Institution occupies beautiful buildings on the Mall, extending from the Capitol to the Washington Monument. Here are found the original buildings of the Institution and the National Museum, while the Bureau of Ethnology occupies rented quarters in another part of the city, and the Zoölogical Park is about two miles north. See NATIONAL MUSEUM OF THE UNITED STATES.

James Smithson (1765-1829), founder of the Smithsonian Institution, was the son of Hugh Smithson, first Duke of Northumberland. He was educated at Pembroke and Oxford and was a fellow in the Royal Society. By his will he left to his nephew about \$515,000, stipulating that if the legatee died without issue, the whole amount should pass to the United States, to found at Washington an institution to be called the "Smithsonian Institution," and to be conducted for the advancement of learning. Strangely, this benefactor of the United States never crossed the Atlantic Ocean; he favored a land he knew only by reputation.

SMOKE, the visible vapor which rises from burning substances. In its more extended sense the word is applied to all the

volatile products of combustion, including soot; but the term is frequently applied to merely the carbonaceous matter which is held in suspension by the gases. Smoke from the many furnaces of a large city often becomes a public nuisance, and in many places laws have been passed requiring the adoption of some device for burning the soot, but no one method has been found successful in all cases. There are many practical difficulties in the way of consuming smoke, but experience has shown that none of them are impossible to overcome. If sufficient air is supplied to furnish oxygen, the combustible parts of smoke can be made to burn and leave only invisible vapors and gases.

In recent years the shortage of anthracite coal and the necessity of using soft coal for domestic purposes has resulted in a general smoke evil in the United States. The resulting damage is inestimable.

SMOKELESS POWDER, a powerful explosive, is made by combining some form of cellulose (wood fiber) with a mixture of sulphuric and nitric acids and then adding acetic acid or acetone. The smokeless powder most extensively used is made by kneading gun cotton (which see) into a paste with acetic acid. When dry this paste forms a cake which is then made into flakes, cords or grains, according to the purpose for which it is intended. This powder has about twice the strength of gunpowder. It is smokeless because the products of the explosion are all gaseous. The products of the explosion of gunpowder are nearly one-half solid matter, and it is this matter that makes the smoke.

Smokeless powder has replaced gunpowder in all artillery and in the navies of all leading nations. It is also used for blasting in certain cases. Each nation has its own variety of powder, to which it gives a special name. *Cordite* is used by the British; *indurite*, by the United States, and *B. N.*, by the French.

SMOL/LETT, TOBIAS GEORGE (1721-1771), a novelist and miscellaneous writer, born near Dumbarton, Scotland. He studied medicine at the University of Glasgow and was apprenticed to a surgeon. His interest, however, was rather in literature than in surgery; and in 1739 he went to England with a tragedy, *The Regicide*, but failing to get for it a stage production, he joined the navy as surgeon's mate. On his return to England he again took up literature. The first of his novels, *Roderick Random*, appeared in 1748,

and its success was immediate. Among his later works the most noteworthy are *Peregrine Pickle* and *Humphrey Clinker*. His novels are carelessly constructed, often coarse and usually marked by a humor which descends frequently into burlesque.

SMOOT, REED (1862-), a United States Senator, born at Salt Lake City, Utah. He was educated at the Brigham Young Academy, Provo, Utah, in 1900 was made an apostle of the Mormon Church, and in 1903 was elected to the United States Senate. His prominence in the Mormon Church, an institution long favoring polygamy, caused strong opposition to his serving, and in 1906 he was unseated. In the following year, however, he was reinstated by Senatorial vote, and has since been reelected. Throughout his terms he has been an able representative of the Republicans and an expert on tariff questions.

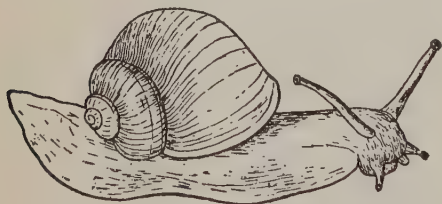
SMUGGLING, *smug'ling*, the fraudulent practice of taking dutiable merchandise into a country without paying the tariff imposed by law. To attempt to introduce goods through channels other than ports of entry; to attempt concealment of dutiable articles of high value; to understate the value of a taxable article—all are violations of law and are punishable with fine, imprisonment or forfeiture of goods. Introducing into a country articles prohibited by law is also regarded as smuggling and is punishable as such.

SMUTS, small fungi which live in certain plants as parasites. Wheat, oats and barley smuts attack the seeds, and can be destroyed by treating the seeds before planting. Wheat seeds soaked for five minutes in a solution of one pound of copper sulphate to a gallon of water are rendered immune; and oat seeds are treated by spreading them on the floor and sprinkling them with a solution consisting of one pound of formalin to fifty gallons of water. Another remedy consists in soaking the seeds in water above 135° F.

As corn smuts do not attack the seeds, they require a different treatment. The spores reside in manures and soils, and from the ground make their way into the young plants. The fungi appear at the tip of the ear as a bluish-black dust, which the wind scatters. They may also appear on the leaves or silk. Rotation of crops is the safest cure for corn smut, as the spores cannot live in the soil more than one season. Infected ears should never be used for planting.

SMYRNA, *smir'na*, the chief seaport of Asiatic Turkey, situated on the Gulf of Smyrna, 200 miles southwest of Constantinople. It occupies a site consisting partly of level ground and partly of the slopes of Mount Pagus, and when seen from the sea presents an attractive appearance. The city is divided into five quarters—the European, quarter, with a fine quay, modern shops and hotels; the Greek, the Armenian, the Turkish and the Jewish quarters. Smyrna has a fine wharf and carries on an important foreign trade, exporting raisins, sponges, carpets and rugs, opium, tobacco, licorice and numerous other articles. The rugs for which it is especially famed come from small places around the city. Population, estimated at 250,000, about one-third of whom are Greeks and one-third Turks. During the World War Smyrna was bombarded by an allied fleet, but was not occupied until the armistice was signed. In 1920 it was awarded to Greece. In September, 1922, following a successful attack by the Turkish army, the city was burned, many of its inhabitants were massacred, and Greek occupation of Asia Minor came to an end. Smyrna reverted to Turkish control.

SNAIL, a small mollusk, which inhabits a univalve, or one-piece, shell. Two general divisions are recognized—land snails and water snails. The shells of land snails are arranged in whorls, which may rise to a point



SNAIL

or may be comparatively flat. Some of them are very beautiful. To protect itself the snail can withdraw into its shell and seal the opening with a membrane. In moving about it carries its shell, to which it is attached by a muscular process, on its back. The part of the snail that protrudes from the shell is called the foot. The head is on the forward end of the foot and contains two sets of tentacles, or feelers, the larger of which are tipped by the eyes. The snail moves slowly, by contracting one portion of the foot after another, and it is aided in its movements by a slimy fluid which it secretes. Land snails live in

damp, shady places usually amongst moss and decaying wood. In France and Italy a species of small snail is cultivated as a food.

SNAKE, a reptile, distinguished by its long, slender body, which tapers gradually to a tail and which is covered with horny scales, but never with bony plates. Snakes have no limbs, though in some species rudimentary hind limbs may be detected. The ribs are very numerous, some snakes having more than 300 pairs. These give form to the body, aid in breathing, and are also, in connection with the scales, organs of locomotion. Snakes crawl upon the ground, by swinging their bodies in loops from side to side, and most of them are able to raise their heads and a large portion of their bodies into the air. They have hooked, conical teeth, which serve to hold their prey, but are useless for chewing.

Some species of snakes are fatally venomous, but most of them are harmless. In the venomous serpents two long poison fangs are firmly fixed in a movable bone, above which is a gland for the secretion of poison. The teeth are perforated by tubes through which the poison is forced. The tongue of a snake is forked, and can be pushed far out of the mouth. It is probably an organ of touch rather than of taste.

Snakes have no eyelids and no external ears. Their nostrils are on the snout. The lower jaw is loosely articulated to the upper, and the tissues about the mouth are so elastic that a snake can swallow an animal really much greater in diameter than itself. Some snakes lay eggs, others produce the young alive. In most species the mother takes great care of her young, and it is said that in one species, the mother, when alarmed, will open her mouth and allow the young to run to cover within her body.

Each locality of the temperate and torrid zones has its own peculiar species of snakes. Some live only in warm, arid regions; some live in moist, shady places, while still others inhabit the water. All the species are vastly more numerous and much larger in the tropics than in the temperate regions. Over 1,500 genera are known, and about twenty poisonous species are found in the United States. Of these the majority inhabit the southwestern portions of the country; two rattlesnakes and the copperhead are the only poisonous species that are natives of the Northern states.

Related Articles. Consult the following titles for additional information:

Adder	Copperhead
Anaconda	Moccasin Snake
Black Snake	Python
Boa	Rattlesnake
Cobra	Viper

SNAKE BIRD. See DARTER.

SNAKE CHARMING. See SERPENT CHARMING.

SNAKE DANCE. See HOPI.

SNAKE INDIANS. See SHOSHONEAN INDIANS.

SNAKE RIVER, a large river of the northwestern part of the United States. It rises in Yellowstone Park, pursues a winding course through Southern and Western Idaho, enters Washington at Lewiston, the head of navigation, and discharges into the Columbia River, near Pasco, Wash. It forms the boundary between Idaho and Northeastern Oregon for 170 miles, and between Idaho and Southeastern Washington for thirty miles. Its upper course is broken by numerous falls and rapids, the most spectacular of which are Shoshone Falls. The total length of the river is about 1,100 miles.

SNAPDRAGON, a group of annual and perennial herbs, most of them native to the temperate parts of the northern hemisphere. They bear spikes of showy, variously-colored flowers having two lipped corollas, so shaped that if opened forcibly they afterward shut with a snap. Thus the name is accounted for. The lower, three-lobed lip is so swollen as to resemble a mouth, and to suggest such descriptive names as dog's, rabbit's and toad's mouth. The plants grow to a height of from one to three feet. They are associated with old-fashioned gardens, but are much cultivated in conservatories. In folklore these plants are credited with power to undo charms.

SNAPPING TURTLE, a species of freshwater tortoise, common to all parts of the United States. It sometimes reaches a length



SNAPPING TURTLE

of three feet and is notable for its fierceness. One species, found around the lower Missis-

siippi Valley, is called the *alligator-snapper* and is noted for the strength of its large jaws. It feeds on small animals and receives its name from its habit of snapping at everything within its reach.

SNIFE, a wading bird usually seen along the shores of rivers and lakes. Snipes are slender and active, both on land and on the



SNIFE

wing. All have narrow bills, longer than the heads, and their eyes are set far back. Usually the plumage is brownish or grayish, and is spotted or streaked with white or black, the whole blending closely with the colors of the ground. The nests are made on the ground among tall marsh grasses, and the eggs, four in number, are olive-brown or drab splotted with brown. When the bird is aroused near its nest, it flies up and down in a zigzag course, making with its wings a curious drumming sound. Common species are *Wilson's snipe*, a native American bird, and a similar species, the *European snipe*; others are the small *jacksnipe* of Northern Europe and the *giant snipe* of Brazil.

SNORING, *snohr'ing*, a breathing with harsh, rough noise through the nose and mouth while sleeping, especially with rattling vibrations of the soft palate. While there are some persons who sleep with open mouth, owing to relaxation of facial muscles, there are others who because of some diseased condition of the nasal passage cannot breathe through the nose. Children who snore do so almost invariably because of some throat or nasal trouble, which should be corrected. Adenoids which hinder nose breathing are a frequent cause of snoring in children. See ADENOIDS.

SNORRI STURLUSON, *snor're stoor'loo son*, (1179-1241), an Icelandic poet and historian. His most famous work, the *Prose Edda*, one of the earliest masterpieces of Scandinavian literature, was completed in

1222, but was not published until the seventeenth century. His *Heimskringla* and record of the kings of Norway from the earliest time to Magnus Erlingsson (1177) also was printed then. Snorri was also a lawyer and a statesman, and in 1215 was president of the legislative assembly and higher court of Iceland. He negotiated a peace treaty between Iceland and King Haakon of Norway, and that ruler, later becoming suspicious of him, had him put to death.

SNOW, frozen vapor falling to the earth in flakes, and covering Mother Earth with a white blanket to protect and prepare vegetation for its awakening in spring. Snow is also of incalculable value as it piles in masses on lofty mountains, where the gradual thaw of spring and summer feeds the springs and streams.

Whenever precipitation occurs at a temperature below 32° F., snow is formed. It is not frozen rain, but consists of minute crystals formed by the freezing vapor. These take various shapes, but are patterns of a six-pointed star, which in large flakes are very beautiful. By collecting such flakes on a coal-black surface, these crystals may be studied with an ordinary magnifying glass. Each flake contains a number of crystals, so arranged as to form beautiful designs, the size depending upon the temperature and the amount of moisture in the atmosphere. Flakes are largest when the atmosphere is heavily charged with moisture and the temperature is just below the freezing point. The amount of water in snow is about one-tenth that in rain; that is, a snowfall of ten inches would be equivalent in water to a rainfall of one inch.

Snow is found in cool temperate regions in the winter, and it falls on the summits of high mountains and in the polar regions throughout the year. The heaviest snowfall is in mountains of the cool temperate regions, where it is several feet each winter, as in the Alps and in some portions of the Rocky Mountains, particularly in the State of Washington and in British Columbia. When frozen in great masses, this snow forms glaciers. The line of perpetual snow is known as the *snow line*, and its location depends upon altitude and latitude.

Related Articles. Consult the following titles for additional information:

Avalanche	Ice
Crystallization	Rain
Freezing	Snow Line
Glacier	Snowshoe

SNOWBALL, or **GUELDER-ROSE**, *gel'der*, a flowering shrub. It is a cultivated form of high-bush cranberry and grows from seven to twelve feet in height. Because of its large, white ball-like blossoms, it is known as the *snowball*. The name *Guelder-rose* is derived from the Dutch province of Guelderland, where the shrub is said to have originated. The flowers of the cultivated plant do not produce fruit; the wild guelder-rose, however, bears small, juicy, red berries.

SNOWBERRY, the popular name of a tropical American shrub which bears snow-white berries. The name is also applied to a native North American shrub of the woodbine family, which also has white berries.

SNOWBIRD, a name given to several finches that early in the spring go far north to nest, returning late in the fall. They gather in large flocks and feed in the snow on the seeds of grass and large plants. The *snowbunting*, often called the snowbird, is common in the northern United States and Canada. It has a gray back, white breast and black and white tail and wings, and is a very pretty bird.

SNOWDROP, a well-known garden plant, belonging to the amaryllis family. It bears a few short, straight, narrow, crisp leaves, and leafless flower stalks, on which are borne drooping, white, bell-shaped flowers, which appear early in spring. The plant is a native of the Alps, but is common in gardens in the Northern United States and Canada.

SNOW LINE, the height or level at which there is perpetual snow. In the tropics it is about three miles above the sea level, and mountains that rise to that height are always capped with snow; in latitude 40° it is about two miles above sea level; and at 55°, it is one mile above the sea. Above the Arctic Circle and below the Antarctic it descends to sea level.

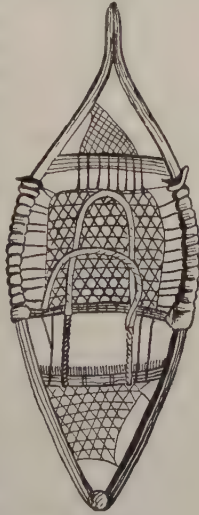
SNOWPLOW, a machine for clearing the snow from roads, sidewalks and railways. Such devices are usually triangular, and are hauled by horses. They push the snow to either side of the path and are useful when the snow does not reach a great depth, after which the accumulation of snow on the sides of the path renders their use somewhat difficult.

Snowplows used on railways are of two kinds—the triangular plow, which is attached to the front end of the locomotive or a special car and removes the snow by being forced

through it, and the rotary plow. The triangular plow differs from that used on ordinary roads in that the sides form an oblique edge, which points downward to the middle of the track. As the plow is forced through the snow it lifts it up and then throws it out on either side of the track.

The rotary plow consists of a large wheel, with buckets attached to an axis, that rotates at right angles to the rails. As the wheel revolves, the buckets scoop up the snow and empty it into a hopper, from which it is thrown to a great distance by a powerful fan. The rotary plow is operated by a special engine and is pushed along by a locomotive. Its effectiveness does not depend upon the speed with which it is moved forward, and it is successful in clearing the deepest of drifts. The danger of delaying traffic for hours or days because of snow depths has practically been overcome by the effectiveness of the modern snowplow.

SNOWSHOE, *sno'shoo*, a device attached to the sole of the shoe to prevent the wearer from sinking into deep snows. It consists of a light frame of wood from three to four feet long and about a foot wide, reinforced with cross bars and strung with thongs of deerskin. Snowshoes are used by hunters, trappers, loggers and farmers in regions where snowfall is heavy. In these shoes the half-breed Indian trappers of Canada, who are the most expert users of them, can run over the snow at the rate of thirty-five or forty miles a day. In all sections of country where snows are heavy, many people use snowshoes as a pleasant diversion; in many localities snowshoe clubs exist as a feature of outdoor sports.



SNOWSHOE

SNUFF, a powder made from the tobacco plant. The dry leaves and stems of the plant are ground in mortars and then scented. Snuff is inhaled through the nostrils, or is rubbed on the gums as an indulgence, like tobacco chewing. The practice of using it, once fashionable in Europe and America, is fast dying out. See TOBACCO.



SOAP, *sope*, a chemical compound of fat or oil, with some alkali, usually potash or soda. There are many varieties, but the soaps of commerce may be roughly classified as household soaps, toilet soaps, manufacturing soaps and marine soaps.

Manufacture. The fat used in common laundry, or household, soaps is tallow, which may be mixed with grease or oil, and is generally known as *stock*. In the course of the manufacturing process rosin is added. This gives the soap a yellow color and also aids in hardening it. The fat is poured in a melted state into large sheet-iron kettles, heated by steam coils. During the heating process lye is added from time to time, until the right proportions of fat and alkali are obtained. When the mixture has the appearance of thick gum, strong brine is added until the soap floats on the surface. As the mixture cools, the brine settles to the bottom of the kettle and is drawn off and worked for glycerine and salt. Fresh, strong lye and rosin are added to the soap, and the mixture is reheated and treated as before. Three operations of this sort are necessary before a soap of the desired grade is produced.

After the third heating cold water is added and the mixture is allowed to cool slowly to 150° F. Then the soap is run into a horizontal cylinder known as the *crutcher*, where it is thoroughly mixed by revolving paddles. During the mixing several ingredients are added, the most important being carbonate of soda. When thoroughly mixed the soap is run into large pans and allowed to harden. It is then cut into cakes by being passed between steel wires, and the cakes are stamped and wrapped ready for the market.

The manufacture of toilet soaps is similar to that already described, except that the crutcher is omitted. For the best grades of toilet soaps, olive oil, palm oil and cocoanut oil are used, and the process of refining is carried further than in the manufacture of laundry soaps. Coloring matter and perfume are added to some of the best soaps, but they are omitted from other grades equally good. Cheap, highly perfumed soaps

should be avoided, because the perfume is usually added to disguise the odor of offensive fats. A soap made of pure oil and good soda is the best for a healthy skin.

Castile soap is made from olive oil and soda. Marine soap is made from cocoanut oil, potash, soda lye and salt; it will dissolve in salt water. The so-called, *naphtha* soaps contain kerosene and a very strong alkali. Manufacturers' soaps are known as *neutral*, because they contain no excess of alkali or fats. This is necessary since these soaps are used in cleansing raw material for delicate fabrics, such as silks and fine woolsens.

SOAPSTONE, or **STE'ATITE**, a soft rock with a soapy feel, composed chiefly of talc and ranging in color from light to dark gray. It is easily sawed into any desired shape. Blocks of the stone are used as foot-warmers, because they hold the heat a long time. Powdered soapstone is sometimes used to prevent friction in machinery, and a soft, white variety is used as tailors' chalk.

SOCIAL DEMOCRATS, the name of a political party established in Germany in 1863 under the influence of Ferdinand Lassalle. It began with a small membership and a simple program based on universal and equal suffrage. In 1875 the followers of Lassalle joined with those of Karl Marx and Friedrich Engels to form the party which became the nucleus of the leading political organization in the Germany of to-day. At the outbreak of the World War the Social Democrats commanded 4,500,000 votes, and were represented in the Reichstag, where they held the balance of power by over a hundred members.

The war caused a division in the ranks, and the party split into two factions—majority Socialists and minority Socialists. The former, led by such men as Philipp Scheidemann and Friedrich Ebert, supported the government and voted war credits; the minority Socialists, who organized under the name of Independent Social Democrats, demanded immediate peace, and preached international Socialism and class conflict. When the German emperor abdicated, in November, 1918, the majority Socialists organized the provisional government, and in the ensuing elections, in February, 1919, they secured control of the National Assembly. Friedrich Ebert was elected President of Germany, and Scheidemann became head of the Cabinet.

The following are the most important planks in the platform of the Social Democratic party, as formerly organized:

1. Universal, equal and direct suffrage by ballot in all elections.
2. Establishing the initiative and veto as means of direct legislation by the people.
3. Removal of all restrictions to the free expression of opinion and the right of meeting or association.
4. Abolition of all laws which place woman at a disadvantage as compared with man.
5. Universal education at the expense of the state.
6. Election of judges by the people.
7. A graduated income and property tax to meet all public expenses which are to be met by taxation. See GERMANY; SOCIALISM.

SOCIALISM, the name of an economic system by which all wealth produced is demanded as the property of individual workers, with the means of production the property of the community or the state. In other words, socialism seeks a change of attitude towards property. At present the world's work is carried on under the domination of private property. Socialism would reverse this process, so that the world's work would ultimately be dominated by public property. Socialists attribute all value to labor, and in the beginning they so emphasized manual labor that intellectual services were given little or no consideration. However, with the rise of a better class of thinkers this view was changed, and socialists of moderate views now understand that intellectual service is as necessary as manual labor.

Socialists argue that, since production is becoming more and more a social process, the control of production should be in the hands of the community or the state. They demand collective management of each industry and that all industries be associated together in order to secure a perfect system, with harmony and unity of effort. They claim that each individual producer acts for himself, that the present industrial system is planless and that it causes industrial crises and business stagnation. Furthermore, if organized society owns the instruments of production and controls production, it would necessarily follow that the distribution of income would have to be by some common authority and that under this plan each worker would be assured of a living wage.

What Socialism is Not. The term *socialism* has been very loosely applied to a number of economic and political doctrines of a revolutionary character.

Socialism is not Communism. Communism advocates the abolishment of all private property, while socialism advocates the retention of private property in income or earnings, and the abolishment of private capital. The Bolshevik movement in Russia was an attempt to apply communistic principles on a large scale (see RUSSIA; BOLSHIEVIKI).

Socialism is not Anarchism. Both seek the same end, the largest freedom of the individual and general equality among men, but they seek this end by opposite means. Anarchism (which see) would abolish all government, while socialism would extend the powers of the state and make government paternal. Anarchism would gain its ends by violence wherever such means seemed to be advantageous, but sane socialism seeks to gain its ends by political evolution. Persuasion and the ballot are its two greatest agencies. "The socialist to-day is the strongest opponent of anarchism."

Political Socialism. Socialism is a world movement. Politically it is "socialism plus democracy." While there is a Socialist party in nearly every country, socialism has gained its greatest strength in Germany, where it first acquired political significance. There are strong Socialist parties in France, Holland, Italy and the Scandinavian countries. International socialistic congresses were held annually from 1889 to the outbreak of the World War, and in 1900 the International Bureau of Socialism was established at Brussels, Belgium. It consisted of forty-one delegates from twenty-seven nations. After the war another international conference was held in Switzerland.

In the United States. The evolution of socialism in America as a party movement has been rapid, as is shown by the Socialist vote at Presidential elections since the party entered the field. In 1888 it was 2,068; in 1904, 442,402; in 1912, about 1,000,000; but in 1916 it fell to 594,095. The national headquarters are in Chicago. Membership in the party is not confined to the cities; there is a large following in the agricultural states. See POLITICAL PARTIES IN THE UNITED STATES, subhead *Socialist Party*.

Socialism and the World War. The Socialist party is international in scope; its adherents are opposed to war, and it was thought at the outbreak of the World War that the Socialists, regardless of nationality, would unite in opposition to the war, and

put forth a strong plea for peace. On the contrary, the majority of the Socialists of all the belligerent countries adhered to their respective governments, and the chief effect of the war upon the party was to cause a division in its ranks and temporarily to break up the international organization. Adherents of the more radical wing maintained a strenuous opposition to the war, especially in Germany, where they boldly opposed the government, and declared that the war was not a war for defense. This caused a division in the party (see SOCIAL DEMOCRATS; GERMANY). In the United States the anti-war Socialists gained control of the organization when the country entered the World War, and many who supported the war left the party.

History. The beginning of the socialistic movement is considered to date from the organization in England of the *Association of All Classes of All Nations* in 1833. The term socialism was used in connection with the organization in a magazine called the *Poor Man's Guardian*, and it soon came into general use. The founders of modern socialism were Karl Marx and Friedrich Engels, who in 1845 organized in Brussels the *German Workingmen's Association*. Here they wrote the *Communists' Manifesto*, which summarized the philosophy of socialism and has since formed the basis of many socialist platforms. At first, socialism, like other new movements, was misunderstood and misjudged, but since the beginning of the twentieth century there is a clearer view. In 1916 it was estimated that the socialists had 11,000,000 voters throughout the world. Socialist parties existed then in twenty-seven nations, including Australia, Japan and most of the South American countries.

Related Articles. Consult the following titles for additional information:

GENERAL

Anarchism	Mothers' Pensions
Child Labor	Old Age Pensions
Communism	Recall
Convict Labor	Referendum
Income Tax	Sabotage
Inheritance Tax	Suffrage
Initiative	Syndicalism
Labor, Department of	Vocational Training
Minimum Wage	

EMINENT SOCIALISTS

Bebel, Ferdinand	Marx, Karl
August	Proudhon, Pierre
Lassalle, Ferdinand	Joseph

SOCIAL SETTLEMENTS, the name given to those houses, or centers, in the poorest districts of great cities, where cultured men and women live, in order to come in con-

tact with, and improve the condition of, the poorer classes. The activities of these societies include efforts at the development of the physical, mental, moral, spiritual and social interests of the poor. The oldest and most famous of the social settlements is Toynbee Hall in London, founded in 1884 and named in honor of Arnold Toynbee, who had taken the first steps toward its organization.

The earliest attempts at founding a settlement in the United States were made in 1887 by Dr. Stanton Coit, who established the Neighborhood Guild in New York. This developed into the University Settlement, which is one of the most efficient organizations of its kind in America. Two years after this settlement was established, Jane Addams and Ellen Gates Starr opened Hull House in Chicago, perhaps the most famous social settlement in the world. To-day there are social settlements in every large city in the United States, and their influence is potent in the development of civic affairs.

The scope of the work is almost unlimited. Nearly all maintain kindergartens, day nurseries, baths, libraries, schools of citizenship, clubs and savings banks, and give instruction at night in public-school subjects to day laborers whose education has been neglected. Social, political and religious meetings may be held in the settlement halls, and proper guidance, supervision and restraint are exercised by the resident workers. The social settlement is one of the most powerful influences at work to-day for the betterment of mankind. A detailed account of the workings of a large settlement is given in Miss Jane Addams' *Twenty Years at Hull House*. See ADDAMS, JANE.

SOCIETY ISLANDS, or **TAHITI**, *tah' hete*, **ARCHIPELAGO**, a French colonial possession in the Southern Pacific Ocean, consisting of two groups of islands, eleven in number, and embracing a total area of 637 square miles. The first group, the Leeward Islands, include Huahaine, Raiston, Tahao and Bora Bora. Of the Windward group Tahiti and Morea are the important islands. The islands are of volcanic origin, are mountainous and surrounded by coral reefs. They are densely wooded, and cocoanuts, bananas, sugar cane, oranges and other tropical fruits are cultivated. The climate is mild and moist, but healthful. The population is about 18,000, chiefly Malay.

SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS, the name given to various organizations whose chief purpose is to secure humane treatment for animals. The first society was organized in England in 1824. Interest in the movement spread, and in 1866 the first American society was organized, in New York. There are to-day such societies in all parts of the world. Through their influence important legislation has been enacted for the protection of domestic animals. Some of the laws are excellent. In many countries railroads are required to unload every twenty-four hours, to feed, rest and water, all stock which is being shipped great distances; and in nearly all countries cruelty to an animal is punishable with fine or imprisonment, or both.

SOCIETY OF JESUS, a Roman Catholic Order. See JESUITS.

SOCIOLOGY, *so she o'lo ji*, a science devoted to the study of society, including the fundamental facts upon which it is based, the history of modern societies, and the description and classification of present social phenomena. It thus covers in its broadest sense the study of the general progress of civilization, including history, economics, jurisprudence and politics. Sociology is based, of necessity, largely upon statistics, and its conclusions are arrived at through an historical and psychological study of the individuals who compose society and of the movements which in the past have affected its form and nature.

To Auguste Comte we are indebted for his conception of a comprehensive social science; he also gave to the study the name *sociology*. Its formal study is generally divided into four classes, each with corresponding divisions and subdivisions: *descriptive sociology*, *social psychology*, *social ethics*, and *social technology*.

Related Articles. Consult the following titles for additional information:

Capital Punishment	Juvenile Court
Census	Labor Organizations
Charity	Marriage
Child Labor	Monopoly
Communism	Mothers' Pensions
Convict Labor	Old Age Pensions
Coöperation	Pauperism
Crime and Criminology	Population
Economics	Prison
Environment	Prohibition
Eugenics	Social Settlements
Factory and Factory Legislation	Socialism
George Junior Republic	Statistics
Heredity	Suicide
Illiteracy	Tenement
Immigration and Emigration	Trusts
	Woman Suffrage

SOCRATES, *sok'ra teez* (469-399 B. C.), one of the greatest philosophers of Greece. He was born at Athens, and, while his education was meager, so great was the inquisitiveness of his mind that he picked up the best thought current in the highly cultivated Athenian society of his day. From his father he learned the sculptor's art, but soon abandoned it and began to go about the streets of Athens questioning those he met on the eternal problems of human life.

For several years he fought as a common soldier. After that he devoted himself entirely to philosophy and the education of the youth of his native city, hoping thereby to make more useful citizens and a more firmly established and morally sound state. By means of conversation, which was simple, yet brilliant, he so illuminated commonplace facts that the great truths underlying them became apparent.

Because of his pure morality, honesty and interest in all mankind, Socrates was highly esteemed by the greatest thinkers of his day, and among his illustrious friends were Plato, Crito, Aleibiades, Xenophon, Aristippus, Euclid of Megara and Phaedon. Yet he was hated by those who opposed his just ideas of government and was accused of corrupting the youth of the state with heretical religious views. He was tried before a court of citizen jurors and in 399 B. C. was sentenced to death. His death potion was a cup of hemlock, drunk at twilight in the prison yard in the presence of his friends Plato and Crito. Of him Plato said, "Thus died the man who of all with whom we are acquainted was in death the noblest, in life the wisest and most just."

Socrates made no attempt to formulate a system of philosophy, nor to commit his ideas to writing. What we know of his doctrines is learned from Xenophon's *Memorabilia* and Plato's *Dialogues*. The great influence which he wielded is largely due to the fact that his ideas were made practical in his life. He was governed always by his high sense of virtue and obeyed conscientiously the promptings of an inner voice, which he declared to be a never-failing counselor. He attained to an intellectual strength and a spiritual peace that give him a place almost alone among the world's greatest thinkers.

SODA, in general, the name of several compounds of sodium found in nature; in particular, several manufactured products of

sodium chloride, or common salt. These include *sodium carbonate* (which may be produced in crystallized lumps or a coarse powder called *soda ash*), used in making glass and soap, for disinfecting and cleaning; and *sodium bicarbonate*, which is cooking soda. This latter is a constituent of baking powder and also of Seidlitz powders. Sodium hydroxide, commonly called *caustic soda*, is used in the manufacture of soap, dyestuffs and paper, and in bleaching and kerosene-oil refining.

SODA WATER, a popular summer beverage, especially in the United States. It is made of water charged with carbon dioxide and fruit flavoring. It contains no soda; it is called soda water because bicarbonate of soda was formerly used in making it. The liquid carbon dioxide is stored in a steel container under heavy pressure; when released by means of a faucet it permeates the water as carbonic acid gas, causing it to effervesce and imparting to it a pungent taste.

Pop, ginger ale and other similar drinks consist of water flavored with various extracts and charged with carbonic acid gas, which is kept under pressure in the bottle. When the cork is removed the gas escapes rapidly and causes the effervescence.

SODIUM, a metallic element discovered by Sir Humphry Davy in 1807. It is silver-white, has a very high luster and is as soft as wax. It is lighter than water, and if thrown on warm water its affinity for oxygen generates enough additional heat to cause ignition of the hydrogen. In contact with cold water the warmth generated is sufficient to melt the sodium. Owing to its affinity for oxygen it has to be kept in liquids that contain no oxygen, such as kerosene. When heated in air or oxygen it burns with a very pure and intense yellow flame. It is perhaps more abundant than any other metal, for it constitutes two-fifths of all the salt existing in sea water and is present in the water of springs, rivers and lakes, in almost all soils and in the deposits of rock salt. Sodium is also contained in sea plants and in land plants growing near the sea. It occurs, also, in most animal fluids.

Sodium is used as an agent in the manufacture of aluminum and magnesium, and as a reagent in chemical operations. Common salt is a compound of sodium and chlorine (see **SALT**). Sodium also occurs as oxide of sodium in a good many minerals;

but it is most common in the form of carbonate, nitrate and borate of soda. Of the numerous salts of sodium, many are important medicinal agents. *Sodium arsenate* is used as a substitute for arsenic and is an important element in fly poisons; *sodium bromide* and *sodium iodide* are prescribed for quieting the nerves; *sodium bicarbonate* is one of the important ingredients of baking powder. See SALTPETER; WATER GLASS.

SOD'OM, one of the five cities situated in the plain of the Jordan River, and referred to in the thirteenth and fourteenth chapters of *Genesis*. It was in Sodom that Lot settled when he separated from Abraham. The city was plundered by Chedorlaomer and was afterwards rescued by Abraham. According to Biblical accounts, this and three other cities—one of them Gomorrah—in the vicinity were destroyed in a miraculous way because of their wickedness. It was at this destruction that Lot and his two daughters were spared, while his wife, not obeying the divine command, was turned into a pillar of salt (*Gen.* XIX, 23-30). The exact location of Sodom is unknown, and authorities differ in regard to it, some believing it to have been at the north end of the Dead Sea and others at the south end.

SODOM, APPLE OF, a fruit mentioned by early writers as growing on the shores of the Dead Sea. It was beautiful to the eye, but when eaten it filled the mouth with ashes. Although no satisfactory explanation has ever been given, it is supposed by some that this "apple" was a gall produced on dwarf oaks by an insect.

SOFIA, or **SOPHIA**, *saw'fe ya*, BULGARIA, its capital and largest city, situated in a plain on an elevation of 1,800 feet above sea level, near the Balkan Mountains, 325 miles north-northwest of Constantinople. It is on the line of railway that after Bulgaria's entrance into the World War was opened from Berlin to Constantinople. Sofia is built on modern plans and has broad, straight streets. The important buildings are the old mosque of Sofia, ruins of which still remain; the Mosque of Buyuk-Jami, used as a museum; the palace of the prince, and the government buildings. The city is the seat of a university founded in 1888. The chief industries include the manufacture of silk and other textiles, and of pottery. Sofia occupies the site of ancient Sardica, and in 1878, since which time the modern part of the city has

been rebuilt, it became the capital of Bulgaria. The city was bombarded by allied airships during the World War. Population, 1920 census, 154,431.

SOIL, that part of the earth upon which we depend for everything we eat and wear, and upon which all animals and plants depend for their sustenance. But this is not what the geologist or the agriculturist calls the soil. To the former the soil is the loose layer on the surface of the earth's crust; to the latter it is that portion of this layer in which plants grow and which is suitable for tillage.

Formation of Soil. The process of forming soil has been in operation since the first solid masses of the earth's surface appeared, and the same agencies which began its formation at that time are still at work and are producing the same results. These agencies are the atmosphere, water, plants and animals, and are explained below.

The atmosphere aids in the formation of soil by mechanical and chemical action—by mechanical action, when strong currents of wind wear away rock in certain localities and deposit the particles in others; by chemical action, when under conditions of moisture the oxygen of the air takes certain substances of which the rock is composed and destroys them, thus causing the rock to crumble.

Water is the most powerful agent in the formation of soil, since it does more than all other agencies in decomposing rocks. It decomposes rocks by wearing them away, as in the case of water in streams, and by breaking up rocks into particles as a result of freezing. At the foot of all cliffs masses of rock fragments are found. These are formed by the water's entering crevices in the rock and freezing and breaking the particles off. These particles are in turn broken up by weathering and by similar action of the water. Water also acts chemically, since oxygen readily attacks substances which the water dissolves from the rock. The combined action of water and atmosphere is known as weathering, and this is by far the most important process in the formation of soil.

Plants contribute to the formation of soil by the decay of roots, leaves and stubble, and frequently by the decay of the entire plant. The roots also assist in breaking up rocks by growing in crevices; and the absorption of nutriment by the plant also decomposes rocks to a limited extent.

Animals contribute to the formation and enrichment of soil by their excrement, by the decay of their carcasses and by burrowing. A good illustration of this is found in the earthworm, which bores its hole by passing the soil through its body. During this process the soil is pulverized and enriched. The holes thus made allow the air to enter the soil, and in this way a fresh supply for soil breathing is furnished (see EARTHWORM). Thousands of insects make the soil their home, and in numerous ways they contribute to its fineness and fertility.

Kinds of Soils. The composition of soil depends upon that of the rock from which it was formed. When the soil overlies the decomposing rock, it is usually of the same nature, but along river beds and in localities which are the beds of ancient lakes, the soil may be of entirely different composition from that of the surrounding rock, since it was transported a long distance by water. A *sandy* soil is one whose composition is nearly three-fourths sand. A *clayey* soil is about half clay, while a *lime* soil is about one-fifth lime. A *peaty* or vegetable soil is made up of peat or vegetable matter. *Loams* are soils containing a mixture of clay, sand, lime and decayed vegetable matter, known as *humus*.

Soil Water. All soil contains water, the amount depending upon the condition of the country in regard to rainfall, and the nature of the soil itself. In soils most suitable for tillage the water exists in the form of a thin film around each minute particle of soil, similar to the film formed around a marble when it is dipped in water. Soils containing clay retain the water much longer than those composed principally of sand or gravel. When too much water is present it gathers in excavations made in the soil and is known as free water. The presence of free water is injurious to growing crops, since it drowns the roots and prevents their obtaining the necessary amount of nourishment.

Value. The soil is the great storehouse of wealth, not only for the farmer, but for all others as well. A fertile soil is the first requisite to successful agriculture. Soil is considered fertile when it contains an abundance of plant food in such state that the plants can appropriate it as needed. The chief ingredients of this food are nitrogen, potash and phosphorus, which occurs in the form of phosphates. The nitrogen is ob-

tained from the decomposition of organic matter which constitutes that portion of the soil known as humus. Potash and phosphorus exist in the mineral portions of the soil, which must be chemically decomposed before these substances can be used by the plant. Many soils, rich in potash and phosphorus, or both, are unavailable because these substances are not in a state to make them available for plant food. On such soils the sort of fertilizer needed is some ingredient that will decompose the rock particles which hold the potash and phosphorus in insoluble form.

Soil Analysis. Before the farmer can obtain the best results from his labors, he must understand thoroughly the condition of his soil; that is, he should know the plant foods it contains and the relative proportion of each. Also, he should know whether or not each of these foods is in such a state that it is available for the plants. So important is this knowledge that the agricultural colleges are making soil surveys throughout their respective states, and the United States Department of Agriculture is doing a similar work for the tillable portions of the public lands.

Any farmer wishing to know the chemical constituents of his soil should write to the agricultural college of his state. If the soil in the vicinity of his farm has been surveyed, he will obtain the desired information. If it has not been surveyed, he will be told what steps to take to secure the analysis. In general, the funds of these colleges do not enable them to analyze soil for individual farmers. The college will, however, refer the farmer to some chemist who will make the analysis for him. The fee is usually ten dollars, but if the knowledge gained enables the farmer to produce more bountiful crops, or to render fertile what the farmer supposed to be worthless soil, the money is very wisely invested. Analysis of the soil of many so-called worn-out farms shows that right methods of treatment will in a few years make them as productive as ever. The best authorities state that the first 16 inches of soil contain an average of 7,122 pounds of nitrogen, 6,035 pounds of phosphoric acid and 23,160 pounds of potash to the acre. Fertilizing the soil means setting these ingredients free as frequently as it means supplying them.

How to Study Soil. First determine whether or not the soil has been formed

chiefly from the underlying rock. If it has, it is of the same composition as the rock, with the addition of humus. If the soil is alluvium, that is, soil has been deposited by water which overflowed the land, its composition will be very different from that of the soil upon higher levels in the same locality. Moreover, alluvium contains a large proportion of humus.

To determine the texture of soil, dry a quantity, then break it into fine particles. If it is lumpy and pulverizes with difficulty, it contains a good proportion of clay. If more than one-half of it is clay, it is known as clayey soil. If about three-fourths of it is sand, it is a sandy soil. If one-fifth of it is lime, it is a limy soil. A soil containing a mixture of sand and clay is loamy.

A perfect soil contains these various ingredients in suitable proportion. It must have sufficient sand to enable it to absorb the requisite quantity of air and moisture, and to render it warm and friable. It must have sufficient clay to prevent too rapid leaching or evaporation of water, sufficient lime to aid in the decay of vegetable matter and enough humus to enable it to retain the best amount of moisture and to furnish the necessary material for the chemical changes necessary to healthy plant growth.

Next determine whether or not the soil is "sour." Soils that have not been worked for a long time are liable to contain an excess of acid. Crops do not thrive in such soils, and before planting, it is always wise to test them for acidity. For this test, procure a small quantity of litmus paper from a drug store. Take a quantity of the soil and moisten it. Lay a strip of litmus paper upon it. If the soil is sour the paper will soon turn red. Soils containing excess of acid can be restored to their normal condition by treating them with slaked lime or hot ashes.

To determine the relative proportion of humus, thoroughly dry a quantity of soil and weigh it. Then place it on an old shovel blade or some other flat metallic surface and heat it to redness. The humus will be burned out. After cooling, weigh again.

What was the loss in weight?

What proportion does this loss sustain to the first weight?

Local conditions may suggest further investigation, and if the farmer is in doubt as to the best method of procedure he should write to his agricultural college, from which

he may always feel sure that he will receive reliable information.

Related Articles. Consult the following titles for additional information:

Alluvium	Humus
Agriculture	Loam
Clay	Loess
Drainage	Manures
Dry Farming	Marl
Erosion	Phosphates
Fertilizer	Rotation of Crops
Irrigation	Sand

SOISSONS, *swa son'*, FRANCE, the capital of an arrondissement in the department of the Aisne, sixty-five miles northeast of Paris. It is one of the oldest towns in France and was the scene, in 486, of the victory by Clovis over the Roman general, Syagrius, which put an end to Roman dominion in Gaul. The cathedral of Notre Dame and the town hall, with a library and museum, are the principal buildings. Soissons was in the battle zone of the World War, and suffered severely from bombardments during the Battle of the Aisne and the Battle of Soissons. In May, 1918, it was captured by the Germans in their great spring offensive.

SOKOTO, *so Jo'toh*, one of the largest states of the British colony and protectorate of Nigeria, in Northern Africa. It has an area of 100,000 square miles and a population of 10,000,000. The land along its northern border, which meets the Sahara Desert, is arid and unproductive. In the south, where there are fertile farming and pasture lands, agriculture and cattle raising are the principal industries, and barley, millet, wheat and hides the chief products. Ostrich farming and coffee raising are growing industries. The most important towns are Sokoto and Kano.

SOLA'NUM, a genus of the nightshade family, containing a wide variety of both useful and nonuseful plants. Among the former are the potato, the tomato and the eggplant. The horse nettle and buffalo bur, spiny weeds that give considerable trouble to farmers, belong to the nonuseful group. The bitter-sweet, another species, is the source of a fluid of medicinal value, and the common nightshade, or belladonna, is also medicinal. The genus contains several hundred species, including herbs and shrubs, and is the most important branch of the nightshade family. See NIGHTSHADE.

SOLAR ENGINE, or **SUN MOTOR**, an apparatus for utilizing the heat of the sun as a motive power, by causing it to convert the water in a small boiler into steam. The most

successful motor yet constructed was invented in 1901 and placed upon a farm near Pasadena, Calif. It consisted of a large mirror, in the form of an umbrella, with a part of the top cut off. The disk contained 1,788 small mirrors arranged at an angle so to catch all the sun's rays striking upon it and to reflect them upon a long boiler containing 100 gallons of water and space for eight cubic feet of steam, set in the center, like the handle of the umbrella. The boiler was connected with machinery that pumped water at the rate of 1,400 gallons each minute. By an automatic arrangement, as soon as sufficient steam was generated in the boiler, the mirror was connected with a system of clockwork which caused it to turn with the course of the sun.

With the reduction in the expense of their manufacture, solar motors of this pattern will make very desirable machines for pumping water for irrigation, as the heat developed by them is very great.

SOLAR MICROSCOPE, an instrument by means of which a magnified image of a small object is projected on a screen, by sunlight or strong artificial light. It is much like a stereopticon. The object to be magnified is placed on a stand at one end of a brass tube. By means of a mirror, rays of light are reflected into the opposite end of the tube; a double-convex lens brings the light rays to focus on the object, while another lens projects a magnified image of the object on the screen. Sunlight is less frequently used with these microscopes than the electric arc or oxyhydrogen limelight.

SOLAR SPECTRUM. See **LIGHT**, sub-head *Spectrum*; **SPECTRUM ANALYSIS**.

SOLAR SYSTEM, in astronomy, the name given to the group of celestial bodies, including the sun and its attendants, which revolve about it in elliptical orbits. To this system belong the eight great planets and their satellites, the asteroids lying beyond Mars, comets and meteorites.

The size of the great solar system is utterly beyond comprehension. Herschel's illustration was that if the earth were represented by a pea, the sun would be a ball two feet in diameter, 327 feet away on one side, and Neptune a plum a mile and a quarter away on the other. (See elsewhere in this work articles on each of the planets and on each group of bodies that belong to the solar system.)

Related Articles: Consult the following titles for additional information:

Astronomy	Gravitation	Planetoid
Asteroids	Meteor	Satellite
Comet	Planet (with list)	Sun

SOLDERS, *soď'urz*, alloys used in joining the surfaces or edges of metals by fusion at the point of contact. The solder should always fuse more easily than the metal intended to be soldered by it. Solders are of two kinds, hard and soft.

The *hard solders* are ductile, will bear hammering and are commonly prepared of the same metal as that which is to be soldered, with the addition of some other, by which a greater degree of fusibility is obtained. Under this head comes the hard solder for gold, which is prepared from gold and silver, or from gold and copper, or from gold, silver and copper. The hard solder for silver is prepared from equal parts of silver and brass, but it is made to fuse more easily by the mixture of one-sixteenth of zinc. The hard solder for brass is obtained from brass mixed with a sixth or an eighth, or even a half, of zinc, and this may also be used for the hard solder of copper.

Soft solders melt easily, but as they are partly brittle, they cannot be hammered. Of this kind are the following mixtures: Tin and lead in equal parts; bismuth, tin and lead in equal parts; bismuth, two parts, tin and lead, each one part.

In soldering, the surfaces to be united must be made perfectly clean and free from oxide.

SOLDIERS' HOMES, homes for disabled or aged soldiers of the United States armies, divided into two general classes: those administered and maintained by the Federal government and those administered and partly maintained by state governments in certain states.

Home for Regular Army Soldiers. The United States maintains a home for disabled and discharged soldiers of the regular army at Washington, D. C., known as the United States Soldiers' Home. All soldiers who have served twenty years in the army and those who have incurred such disability as to disqualify them for further service are admitted. The home is in charge of commissioners.

Home for Volunteer Soldiers. Another federal institution is the National Home for Disabled Volunteer Soldiers, which is subdivided into ten branches in various cities of the United States. These are located in the following cities:

Dayton, Ohio	Leavenworth, Kan.
Milwaukee, Wis.	Santa Monica, Cal.
Togus, Me.	Marion, Ind.
Danville, Ill.	Jackson City, Tenn.
Hampton, Va.	Hot Springs, S. D.

Confederate veterans of the Civil War have a home at Beauvoir, near Biloxi, Miss., the former estate of Jefferson Davis.

State Soldiers' Homes. There are a number of state homes for disabled soldiers who for various reasons are unable to secure admission to the national institution. The Federal government contributes toward the support of the state homes \$100 for each soldier, based upon the average attendance for the year. The remainder of the expense is paid by the individual state. Some of these homes are conducted on the cottage plan. The following is a list of the state homes:

California—Yountville.	Nebraska—Gd. Island.
Colorado—Monte Vista.	New Hampshire—Tilton.
Connecticut—Noroton Heights.	New Jersey—Kearny and Vineland.
Idaho—Boise.	New York—Bath and Oxford.
Illinois—Quincy.	North Dakota—Lisbon.
Indiana—Lafayette.	Ohio—Sandusky.
Iowa—Marshalltown.	Oregon—Roseburg.
Kansas—Fort Dodge.	Pennsylvania—Erie.
Massachusetts—Chelsea.	Rhode Island—Bristol.
Michigan—Grand Rapids.	So. Dakota—Hot Springs.
Minnesota—Minnehaha.	Vermont—Bennington.
Missouri—Saint James.	Washington—Orting and Port Orchard.
Montana—Columbus Falls.	Wisconsin—Waupaca.
	Wyoming—Cheyenne.

SOLE, a broad, flat fish with a dorsal fin extending from head to tail. The common European sole, a brown fish with very white, firm flesh, is much esteemed for the table. The average length is about twelve inches, and the weight is eighteen ounces. These fishes live most of the time in shallow waters of sandy coasts; sometimes they ascend rivers in the spawning season, and they retire to the depths of the ocean in cold weather. They are sometimes caught with lines, but usually with trawl-nets. The American sole, or *hogchoker*, common on the Atlantic coast, is a smaller fish, only about six inches long, and is not much used for food. The transparent sole of the Pacific coast differs from most other species in having no fins on the under side.

SOLEMN LEAGUE AND COVENANT.

See COVENANT.

SOLICITOR, *solis'it or*, a person authorized by law to represent another in court of

justice. In the United States the distinction between solicitors and other lawyers is not recognized. Under the laws of Great Britain solicitors constitute a class of attorneys who are officers of the court, the go-betweens of the barristers; the latter act as advocates in the argument and conduct of cases. A solicitor may appear before a magistrate in the lower courts, but cannot appear as an advocate in a superior court.

SOLID. In geometry this term signifies a magnitude which has the three dimensions of length, breadth and thickness. In physics a solid is a body having a definite shape and thus differing from liquid and gaseous bodies, which conform to the shape of the space containing them.

Related Articles. Consult the following titles for additional information:

Arithmetic	Cylinder	Prism
Cone	Geometry	Pyramid
Cube	Mensuration	Sphere
Cubic Measure		

SOLITAIRE, *sol e tair'*, any card game played by one person. The player shuffles the pack, from which certain cards may have been eliminated, then plays the cards, one at a time, holding the pack face downward. The object is to arrange the cards in suits, building up or down according to certain rules. Most games of solitaire depend for their working out solely on the run of the cards not on any skill of the player.

SOLOMON (the Prince of Peace), the third king of Israel, was the son of David and Bathsheba. He was born in Jerusalem and was chosen by David to succeed to the throne, instead of his elder brothers. He was about twenty years old when he came to the throne and ruled nearly sixty years, until 931 B. C.

By his remarkable judicial decisions and his completion of the political institutions of David, Solomon gained the respect and admiration of his people; while by the building of the Temple, which gave to the Hebrew worship a magnificence it had not possessed, he bound the nation still more strongly to his throne. The wealth of Solomon, accumulated by a prudent use of the treasures inherited from his father, by successful commerce, by a careful administration of the royal revenues and by an increase of taxes, enabled him to meet the expense of building palaces, cities and fortifications, and of supporting a luxurious court. Fortune long seemed to favor this great king; and Israel, in the fullness of its prosperity, scarcely perceived that he was

continually becoming more despotic. Contrary to the laws of Moses, he admitted foreign women into his harem; and in his old age permitted the free practice of their idolatrous worship and even took part in it himself. Toward the close of his reign troubles arose in consequence of these delinquencies, and the growing discontent, coming to a head after his death, resulted in a division of the kingdom.

The wisdom of Solomon is proverbial. He knew human nature and possessed a store of facts not known by any other man of his time. According to the Bible, he spoke "three thousand proverbs and his songs were a thousand and five." Of these only the poem known as *The Song of Solomon* and the proverbs contained in the Biblical book of *Proverbs* are known to-day, and the authorship of these is a matter of controversy. See SOLOMON'S SONG.

SOLOMON ISLANDS, a group of islands in the Western Pacific Ocean, lying southeast of Bismarck Archipelago, east of New Guinea and between New Britain and New Hebrides. The larger islands are of volcanic origin, and most of the smaller ones are of coral. Their total area is about 16,950 square miles. The climate is hot and unhealthful, earthquakes are frequent, and there are several active volcanoes. The population is estimated to be 180,000, nearly all of whom are Malays and Papuan negroes. Most of the islands are controlled by Great Britain.

SOLOMON'S SONG (called also the *Song of Songs*, or *Canticles*), one of the canonical books of the Old Testament. From the earliest period this book has been the subject of much controversy. It seems to have been a recognized part of the Jewish canon in the time of Jesus. Till the beginning of the present century the author of the book was almost universally believed to be Solomon, but modern critics attribute it to an author of Northern Israel, who wrote it about the middle of the tenth century B. C., shortly after the death of Solomon, in a spirit of protest against the corrupt splendor of the court of Zion. By the Jews it has been regarded as a spiritual allegory, embodying the union of God and Israel; by Christian theologians it has been regarded as symbolizing the relationship of Christ and the Church.

SOLON (638?-558? B. C.), one of the seven wise men of Greece, and the first great legislator of Athens. At the risk of his life

he urged the Athenians to recover Salamis. He was made chief archon in 594 B. C., and was invested with unlimited powers. He established a new constitution, divided the citizens according to their wealth and added to the powers of the popular assembly. He made many laws relating to trade and commerce, and he either entirely abrogated all debts or so reduced them that they were not burdensome to the debtors, abolishing the law which gave a creditor power to reduce his debtor to slavery. When he had completed his laws he bound the Athenians by oath not to make any changes in his code for ten years. He then left the country, to avoid being obliged to make any alteration in them, and visited Egypt, Cyprus and other places. Returning after an absence of ten years, he found the state torn by the old party hate; but all parties agreed to submit their demands to his decision. It soon became evident, however, that Pisistratus would succeed in gaining the chief power, and Solon left Athens. Though Athens now fell under the despotic rule of Pisistratus, much of Solon's legislation remained effective. See GREECE, subhead *History*; ATHENS, subhead *History*.

SOLSTICE, *sol'stis*, in astronomy, the point in the ecliptic at the greatest distance from the equator, at which the sun appears to stop or cease to recede from the equator, either north in summer or south in winter. There are two solstices—the summer solstice, the first degree of Cancer, which the sun reaches about the 21st of June, and the winter solstice, the first degree of Capricorn, where the sun is about the 22d of December. The time at which the sun is at either of these points also receives the same name.

SOLUTION, the transformation of matter from either the solid or the gaseous state to the liquid state, by means of a liquid called the *solvent*, or *menstruum*. When a liquid adheres to a solid with sufficient force to overcome its cohesion, the solid is said to undergo solution, or to become dissolved. Thus, sugar or salt may be brought into solution by water; camphor or resin, by spirit of wine; silver or lead, by mercury. Solution is facilitated by increasing the extent of the surface exposed to the solvent, which may be most easily done by reducing it to powder. Heat, by diminishing cohesion, usually favors solution; but there are exceptions to this rule, as water just above the freezing point will dissolve nearly twice as much lime as it dissolves at

the boiling point. If a solid body be introduced in successive small portions into a definite quantity of a liquid capable of dissolving it, the first portions disappear most rapidly, and each succeeding portion dissolves less rapidly than its predecessor, until solution altogether ceases. In such cases the forces of adhesion and cohesion balance each other, and the liquid is said to be *saturated*.

SOLWAY FIRTH, *furth*, an arm of the Irish Sea, between Scotland and Cumberland County, England. Throughout its length of thirty-five miles it is shallow, ebb tide leaving much of its coastal bed dry. The spring tide enters the firth in a bore six feet high and at the rate of ten miles an hour. Salmon and other fish are abundant, and fishing is an important industry. The principal ports on its shores are Whitehaven, Harrington and Kirkcudbright. The rivers flowing into it are the Esk, the Derwent, the Dee, the Nith and the Annan.

SOLYMAN II, or **SULEIMAN II**, *soo'lay mahn*, surnamed *the Magnificent* (about 1495-1566), sultan of the Turkish Empire, the son of Selim I, whom he succeeded in 1520. Having put down a revolt which occurred in Syria and Egypt and having concluded an armistice with Persia, he besieged and took Belgrade in 1521. The next year he captured the island of Rhodes, which had been in the possession of the Knights of Saint John for over two hundred years. Turning his arms against Hungary, he won the Battle of Mohacs and captured Buda and Pesth. In 1529 he advanced on Vienna, but was forced to raise the siege, with great loss. His armies next gained considerable territories from Persia. In 1541 he overran a great part of Hungary, but an armistice was concluded in 1547. Late in his reign he attempted the capture of Malta and began another war against Hungary, but died in the midst of his plans. He was an enlightened ruler, considering the age in which he lived, and under him Turkey reached the height of its power.

SOMALILAND, *so mah' le land*, or **SOMALI**, a region in the eastern part of Africa, forming the peninsula which lies between the Gulf of Aden and the Indian Ocean. Politically it is divided into four dependencies, subject to France, Great Britain, Italy and Abyssinia, respectively. The boundaries of Abyssinian Somaliland are indefinite, running into desert conditions.

French Somaliland, or **Somali Coast**, as it is officially known, is the most northerly of the Somaliland dependencies, lying at the head of the Gulf of Aden. Its area is 5,790 square miles, and its population is about 213,000. The coasts are hilly; the interior is an elevated plateau. It carries on an export trade in gold, ivory, skins, hides and coffee. Jibuti, the principal port, which is also the seat of government, has a population of 16,500.

British Somaliland, officially known as *Somaliland Protectorate*, borders on the Gulf of Aden and adjoins Somali Coast and the Italian and Abyssinian dependencies. Almost its entire area of 68,000 square miles is a sandy plain, broken by occasional mountains of basalt and granite. The population, about 300,000 is made up chiefly of wandering herdsmen. Ivory, cattle, sheep and skins are exported. The largest town and seat of government is Berbera, which has a population of about 30,000.

Italian Somaliland, called officially *The Colony and Protectorate of Italian Somaliland*, extends from British Somaliland to the Juba River. Almost its entire area of 139,430 square miles is arid. The coast is flat; the inland is hilly. The chief exports are skins and hides; small quantities of cotton, gums and live stock are also exported. The population is about 650,000. The chief ports are Obbia and Mogadiscio. The country is administered by a governor.

SOMERVILLE, *sum'ur vil*, MASS., a city in Middlesex County, adjoining Boston, Chelsea and Cambridge, on the Mystic River and on the Boston & Albany and the Boston & Maine railroads. The city is built on seven hills and covers an area of about four and one-fourth square miles. It is primarily a residence place and contains many fine homes. There are fine public parks and a number of places of considerable historical interest. In Powder House Park is an old building, constructed about 1703 and used for a long time as a powder house. Central Hill was occupied by a redoubt during the siege of Boston, and on Prospect Hill Washington is supposed to have first unfurled the American flag. The city has a large public library, an industrial school for boys and business schools. The Somerville Hospital is partly supported by the city, and there are homes for the aged, a day nursery and an almshouse. Other prominent buildings are a city hall, a

Carnegie Library and a state armory.

There are various manufacturing establishments, of which the packing houses and the boiler tube works are the most important. Other products are desks, picture frames and jewelry. The place was settled about 1630, was incorporated as a town in 1842 and chartered as a city in 1872. Population, 1910, 77,236; in 1920, 93,033.

SOMME, *sohm*, a small river in Northern France, near which was fought in 1916 one of the severest battles in history. The river rises in the department of Aisne and flows southwest, entering the English Channel about fifteen miles beyond Abbeville. Its length is 140 miles. It is connected by canal with the Oise and the Scheldt.

Battle of the Somme, the Anglo-French offensive drive against the Germans in the summer of 1916, directed by Sir Douglas Haig, commander in chief of the British, and Marshal Joffre, commanding the French; American divisions assisted. In two weeks the British advanced three miles on a ten-mile front and captured 10,000 men; the French advanced six miles on an eleven-mile front and captured 12,235 prisoners. After a lull in August, the offensive was resumed early in September and was continued into November. The allies lost 675,000 men, the Germans 700,000. The allies, besides gaining 120 square miles of territory, inflicted heavy losses on the Germans, drew large forces from the eastern front and compelled the enemy to concentrate attention at the Somme instead of the vicinity of Verdun. See **WORLD WAR**.

SOMNAMBULISM, *som nam' bu lis'm*, or **SLEEPWALKING**, a peculiar activity of the mental functions during sleep, wherein the subject moves and acts as if awake, although without consciousness.

Walking in sleep is the most noticeable, but not the most marvelous, characteristic of somnambulism. The somnambulist may perform many voluntary actions, which show that to all appearances he is conscious of the things surrounding him. He may get out of bed, dress himself, go out of doors, and walk, frequently over very dangerous places, in perfect safety; in fact, he may expose himself without fear to perils which in his waking moments would seem insurmountable. On waking in the morning, the subject is either utterly unconscious of having stirred in the night or remembers it only as a mere dream.

The sleepwalker should never be awakened nor startled suddenly.

In some cases somnambulists have held intelligent conversations. Sensitive and excitable people are subject to the complaint, which often accompanies other nervous affections. It appears to be hereditary. Tests have proved that a somnambulist cannot hear ordinary sounds; that he cannot see, whether his eyes be closed or wide open; and that he can neither taste nor smell. He is, however, endowed with surprising muscular control. Lady Macbeth's exhibition of somnambulism is famous in literature. The condition incited by hypnotism is an artificial somnambulism. See **HYPNOTISM**.

SOMNUS, (from the Latin, meaning *sleep*), in ancient mythology was the god of sleep, son of Nox (night) and twin brother of Mors (death). He was supposed to bring sleep both to gods and men.

SONATA, *sonah'tah*, an instrumental composition of three or four distinct parts or movements, each a complete composition in itself, and all held together by certain bonds of union and forming a perfect whole. The several movements may be likened to the chapters of a book, each of which has a distinct unity of its own and all related and combining to produce a single work. The sonata commonly begins with an allegro, a quick, vivacious composition; or it may begin with a slow introduction. This is followed by a slower movement—*andante*, *adagio* or *largo*. Then comes a minuet, trio or scherzo, and finally a rondo in quick time. The concerto, the symphony and the suite are all written in the sonata form. Haydn and Mozart excelled in this form, and Beethoven was the greatest master of it.

SONNET, a poem of fourteen lines, rhyming according to a prescribed scheme. The form is of Italian origin. The sonnet is usually written in ten-syllable or five-foot measure; but it may be written in eight-syllable lines. It consists of two groups of lines or verses. The first is a group of eight lines (two quatrains); the second is a group of six lines (two tercets or triplets). The rhyming scheme of the first group is: *a, b, b, a; a, b, b, a*; that is, the first, fourth, fifth, and eighth lines rhyme and the second, third, sixth and seventh. The tercets may have two rhymes or three thus: *c, d, c, d, c, d*, or *c, d, e, c, d, e*. There are many deviations from the sonnet as described. The Shakespearean sonnet con-

sists of three quatrains of alternating rhymes and a couplet at the end. In modern French sonnets the tercet opens with a couplet and ends in a quatrain of alternating rhymes.

The sonnet usually consists of one principal idea elaborated. The lightness and richness of the Italian, Spanish and Portuguese languages enable their poets to express every feeling or fancy in the sonnet; but in English it has been found most suitable to grave, dignified and contemplative subjects. Among the most successful writers of English sonnets are Shakespeare, Milton, Wordsworth, Mrs. Browning and Rossetti. Mrs. Browning's *Sonnets from the Portuguese* are the most celebrated group of poems of this kind in our literature, and as examples of the most famous single sonnets from other authors may be mentioned Milton's *On His Own Blindness*; Wordsworth's *On Milton*; Shakespeare's "Let me not to the marriage of true minds;" Keats's *On Looking into Chapman's Homer*; Shelley's *Ozymandias*. Milton's *On His Own Blindness* is here given complete:

When I consider how my life is spent
Ere half my days, in this dark world and wide,
And that one talent which is death to hide
Lodged with me useless, though my soul more bent
To serve therewith my Maker, and present
My true account, lest he returning, chide;
"Doth God exact day-labor, light denied?"
I fondly ask. But Patience, to prevent
That murmur, soon replies, "God doth not need
Either man's work, or his own gifts. Who
best
Bear his mild yoke, they serve him best. His
state
Is kingly; thousands at his bidding speed,
And post o'er land and ocean without rest;
They also serve who only stand and wait."

SONS OF LIBERTY, in American colonial history a society, organized for the purpose of opposing certain British policies unfavorable to the colonies. It came into existence in 1764, at the time of the Stamp Act agitation. In the beginning it was not a single organization, but a group of public-spirited associations with members in all the thirteen colonies, those in New York and Connecticut being the most active. The work was in time coördinated, and the society was chiefly responsible for the repeal of the Stamp Act in 1766. The members favored independence, and had much to do with the calling of the Continental Congress.

SONS OF VETERANS, an American patriotic society organized at Philadelphia, Pa.,

on September 29, 1879. Only lineal male descendants of honorably discharged soldiers, sailors and marines who served in the Civil War are admitted to membership, which at present is about 56,000. The insignia of the society is a bronze bar (on which is inscribed *Fili Veteranorum*, the Latinized name of the society), with a medallion bearing a monogram of the letters "S V" in a wreath above crossed cannons. The Daughters of Veterans is a similar organization.

SOOT, a black substance which results from the imperfect combustion of certain substances. Wood, coal and some fuel oils are the principal soot producers. Smoke and its accompaniment soot are among the chief nuisances of large cities. It has been estimated that in London the damage from soot is \$25,000,000 a year; in Pittsburgh, Pa., it was once nearly as great. Soot has a certain economic value. The large amount of nitrogen it contains makes it valuable as fertilizer. The pigment called *bistre* is made from chimney soot, and *lampblack* is the product of oil or resin soot. See SMOKE.

SOPHIA, *so'fe ah*, CHURCH OF SAINT. See SAINT SOPHIA.

SOPHISTS, *sof'ists*, a class of Greek philosophers who appeared in the fifth century B. C. They did not originate positive doctrines, but exerted a negative influence, maintaining a critical attitude toward existing ideas and attempting to overthrow established institutions and systems of thought. By false reasoning they were able to make what was the worst appear the better. Therefore they argued, since through reason, the highest of human faculties, man is led astray, human knowledge is worthless. Protagoras, the leading Sophist, held that since knowledge of the external world is dependent on sensation, and since sense impressions are variable, knowledge cannot be accurate. Therefore, there is no ultimate criterion, and each man is the measure of his world, and all knowledge and belief are relative. The Sophists failed to detect the identity beneath differences of appearance or to apprehend the unity of life. The logical outcome of such teaching and belief was the doctrine that each man was a law unto himself. The Sophists were despised by Socrates and by his followers.

SOPHOCLES, *sofo'kleez* (about 496-406 B. C.), one of the greatest of Greek dramatists, was born at Colonus, a suburb of Athens. His first play *Triptolemus*, submitted in com-

petition with Aeschylus, won a first prize; and for thirty-two years he produced plays, receiving first prize twenty-four times. He served the state on several occasions. In 440 B. C. he was chosen one of ten generals in the war against the aristocrats of Samos; later he was a general in the Peloponnesian War.

Of the 130 plays ascribed to Sophocles, seven are extant and of undisputed authorship. They are, in chronological order, *Antigone*, *Electra*, *Trachiniae*, *Oedipus Tyrannus*, *Ajax*, *Philoctetes* and *Oedipus at Colonus*. Sophocles brought the Greek drama to the highest point of which that form of art is susceptible. He introduced several dramatic innovations—a third actor, an increase in the size of the chorus, and scenery. Whereas the characters of Aeschylus are heroic, those of Sophocles are human, revealing in the author a masterly knowledge of human nature. The tendency of the plays is ethical, and means are subordinated to ends. No tragic poet of ancient or modern times has written with more elevation and purity of style than Sophocles, and his versification stands alone in dignity and elegance.

SOPRANO. See SINGING.

SORBONNE, *sor bohn'*, a famous university in Paris, a great center of French learning, and the outgrowth of a medieval theological seminary founded by Robert de Sorbon. In its early history it was one of the most important theological schools in Europe. Its faculty was constantly called upon to pronounce opinions on important questions, and it exercised a decided influence on French history. After the French Revolution the theological school disappeared, and the institution was devoted solely to the advancement of all other higher learning. In the middle of the nineteenth century the Sorbonne became the property of the city of Paris, and in 1889 a splendid building called The New Sorbonne—perhaps the finest university building in the world—was erected. The faculties of science and letters of the University of Paris are installed here. In normal times the registration of students is about 5,000.

SOREL, *so rel'*, QUE., the county town of Richelieu County, on the right bank of the Richelieu River at its junction with the Saint Lawrence, and on the Canadian Pacific and the Quebec Southern railways. It is forty-two miles northeast of Montreal, with which it has daily boat connection in summer. The

shipbuilding establishments and foundries are important. There are also manufactories of agricultural implements, sash and doors, clothing, plumbers' supplies, aerated waters and saws. Population, 1921, 8,124.

SORGHUM, *saw' gum*, a genus of grasses, one species of which is cultivated for its sweet sap, from which a molasses, popularly known as sorghum, is made. About 15,000,000 gallons of sorghum syrup are produced annually in the United States. Sorghums are tall plants, without ears but with seed heads at the top. Closely related species are kafir corn and broom corn, which are not syrup producers. They are used as forage plants and as packing for silos.

SORORITY, an association of women and girl students corresponding to the men's fraternities in colleges and universities in the United States. Sororities followed logically the introduction of coeducation in colleges and came to be a regular part of woman's participation in the social activities of college life. Like the men's fraternities, they are secret to the extent of protecting their mottoes, constitutions and grips from the knowledge of outsiders. Each sorority has branches, called "chapters," in the various colleges, only one, however, in each institution. Most of them publish catalogues, containing interesting information about the sorority, and some issue periodicals. The oldest of the coeducational sororities is the Kappa Alpha Theta, founded at De Pauw University in 1870.

SORREL, a perennial herb of the buckwheat family. The plant grows to be two feet high and has sour, juicy, arrow-shaped leaves. In Europe it is cultivated and used as a potherb and for salads. The common American sorrel is a smaller plant, and has small white, yellow or pink flowers. *Sheep sorrel* has wide-spreading roots, which make it troublesome to farmers. Indian sorrel, grown in the tropics, is used to flavor jellies and to make cooling drinks. Of the other varieties, the most common are *mountain*, *switch* and *water sorrel*.

SORREL TREE, a tree belonging to the heath family, found in the southeastern part of the United States as far north as Pennsylvania. The leaves are long and toothed and strongly acid, and from them a cooling drink may be prepared. Clusters of small, white, ball-shaped flowers are produced in summer, and after these, tiny egg-shaped berries covered with down. The sorrel tree some-

times grows to be sixty feet high. The wood is hard and fine-grained, and is used for making such articles as tool handles.

SOTHERN, *suth'urn*, EDWARD H. (1859–), an American actor, born at New Orleans, La., the son of a famous actor. At the age of twenty he began his theatrical career in New York and after five years' struggle became leading man in Sardou's *Scrap of Paper*, in Howard's *One of Our Girls* and in *The Highest Bidder*. In 1888 he was engaged by Daniel Frohman, and for a number of years was a leading man in the Frohman Stock Company, winning conspicuous successes in *Chumley*, *The Prisoner of Zenda* and *If I Were King*. In 1900 he began to devote his attention to Shakespearean rôles, and, in association with Julia Marlowe, produced Shakespearean repertory for several years. He married Miss Marlowe in 1911. His autobiography, *The Melancholy Tale of Me*, was published in 1916. Mr. Sothorn endeared himself to thousands of soldiers in France as a Y. M. C. A. entertainer during the World War.

SOUL, *sole*, the spiritual personality, the immaterial part of man as opposed to his body. Soul is sometimes conceived of as synonymous with *mind*, but generally it is used in a wider sense, as being a whole to which belong the faculties that make the mind. *Soul* and *spirit* are more nearly synonymous, but each is used in connections in which it would be improper to use the other. Nearly all philosophies agree in regarding the soul as that part of man which enables him to think and reason, and which renders him a subject of moral government, but they differ when it comes to a question of origin and detail. Those matters have been forever providentially hidden from man.



SOUND. Sound is produced by air vibrations from a solid body. Touch lightly the edge of a small bell or the tongue of a jewsharp when it is sounding, and you will feel the vibrations, but your touch will probably stop the vibrations and sound will cease. The

reeds of an organ, the strings of a violin, the wires of a piano, the head of a drum and all other sound-producing bodies vibrate in producing sound.

How Sound Travels. The vibrations of the sounding body start similar vibrations in the body through which the sound travels. When a bell is rung, the vibrations of the bell start vibrations in the atmosphere, which move in every direction from the bell and carry the sound. Sound will travel through any elastic substance, but it will not travel through a vacuum.

Sound travels through air at a temperature of 32° F., at the rate of 1,090 feet per second, and this velocity increases 1.1 feet for every additional degree in temperature; at 60° the velocity is 1,120 feet. Sound travels through hydrogen about four times as fast as through the air, and it moves through water at about 4,700 feet per second; through copper, its velocity is a little over eleven times as great as through the air, and through steel it is about fifteen times as great. By noticing a flash of lightning and counting the number of seconds between it and the report of the thunder, the distance of the cloud can be determined. The sound requires five seconds to traverse a mile, so the distance in miles is one-fifth the number of seconds.

Loudness of Sound. The loudness of sound depends upon the size of the vibrations; the greater the vibration, the louder the sound. Large bodies in vibration produce louder sounds than small ones. The intensity decreases in proportion as the square of the distance from the sounding body increases. When the distance from a sounding body is doubled, the sound is reduced to one-fourth. Speaking tubes confine the sound within narrow limits, so that the sound waves are conveyed much farther than they would be in the open air.

Difference in Sound. One man sings bass, another tenor; one lady has a soprano voice, another sings contralto. Some people speak in low, heavy tones, and others in high tones. The different keys on the piano give forth different tones. What is the cause of these different sounds? If we examine the piano we find that the keys that strike the long heavy cords are those that produce the low, heavy tones, and that the keys that produce the high tones are those that strike the short, fine cords. We can apply this illustration to any other sound-producing body and find that it holds true. The difference in sounds is due chiefly to the difference in the number of vibrations of the sounding body in a given time. The low tones are produced

by those bodies that have a low number of vibrations per second, and the high tones by those that produce a high number of vibrations. This is illustrated in the musical scale; middle C tone is produced by 256 vibrations per second. The other tones are as follows:

C	D	E	F	G	A	B	C
256	288	320	341	384	427	480	512
Do	Re	Mi	Fa	Sol	La	Ti	Do

The difference in pitch produced by doubling the number of vibrations is called an *octave*.

Reflection of Sound. When sound waves strike a hard surface, they are thrown back, or reflected, in the same way as are rays of light from a mirror. Curved walls, like the domes of buildings and the rounded ceilings and ends of audience rooms, reflect sound waves to a common point, and a person standing at this point can often hear a whisper that is uttered in some other part of the room. For this reason the name *whispering galleries* has sometimes been applied to such places. Ear trumpets are simply instruments for gathering waves of sound and reflecting them to a common point, and they are equivalent to an increase in the size of the ear. By their means sounds can be heard that could not otherwise be perceived.

An echo is produced when the reflecting surface is so far away that the sound which it throws back is distinct from the original sound. Remarkable echoes occur among mountains, where the ranges upon both sides of the valley are in such position that the sound is reflected back and forth several times. Audience rooms that are too large or are not well proportioned are often difficult to speak in, because of the echoes.

Quality of Sound. The difference between noise and music is, theoretically, the difference between regular and irregular vibrations. The quality of a tone depends upon the character of the sounding body. To illustrate, a piano, a flute and a violin may all produce a tone of the same pitch, but the tone of each can be distinctly recognized because of the differences between the instruments producing it.

Related Articles. Consult the following titles for additional information:

Ear	Light
Echo	Lightning
Harmonics	Music

SOUNDING, the operation of finding the depth of water and the quality of the bot-

tom, especially by means of a plummet sunk from a ship. In navigation two plummets are used, one called the *hand lead*, weighing about eight or nine pounds, and the other, the *deep-sea lead*, weighing from twenty-five to thirty pounds. The former is used in shallow waters, and the latter at long distances from shore. Sometimes the nature of the bottom has been ascertained by attaching tal-low to the base of the deep-sea lead. The scientific investigation of the ocean and its bottom has rendered more efficient sounding apparatus necessary, and has led to the invention of more complicated contrivances.

SOUSA, *soo'za*, JOHN PHILIP (1854-), an American composer and band leader, born at Washington, D. C. He conducted the Marine Band at Washington at two different times and in 1892 he formed the organization known the world over as Sousa's Band. Sousa has written extensively for band and orchestra; and his military marches, among them *The Washington Post*, *Under the Double Eagle*, *El Capitan*, *King Cotton*, *Liberty Bell* and *The Stars and Stripes Forever*, are very popular. A number of descriptive suites and light operas also stand to his credit, and several novels. In 1917 Sousa was chosen to organize bands at the Great Lakes Naval Training Station and was made a lieutenant in the United States navy.

SOUTH AFRICA, UNION OF. See UNION OF SOUTH AFRICA.

SOUTH AFRICAN WAR (1899-1902), a war for supremacy in South Africa, fought between Great Britain and two Boer republics—the South African (now the Transvaal) and the Orange Free State.

Causes of the War. In 1884 gold was discovered in the Witwatersrand, which drew an increasing number of foreigners to the Transvaal each year. By 1899 the *Uitlanders*, as the Boers called the foreigners, outnumbered the original settlers by seven to three. Most of these foreigners were British subjects, and the Boers suspected them of hating the Dutch. Under the leadership of their president, Paul Kruger, the Boers planned from the beginning of this migration to keep the Uitlanders from gaining control of the government. The naturalization laws, which before 1885 had been liberal, were restricted, until in 1887 the term of residence for naturalization was fixed at fifteen years.

The foreigners, of course, claimed that they were entitled to a voice in the govern-

ment and that the restrictions imposed upon them were unjust. Jameson's Raid, in 1896, brought matters to a crisis, and although the British government had Jameson punished, the Boers used the incident as an excuse for further restrictions on the Uitlanders. The latter petitioned Great Britain, but the negotiations which the British government attempted to make with the Boers failed in the end, and it became apparent that the question could not be settled peacefully. War was declared in October, 1899, the Orange Free State joining cause with the South African Republic.

Campaigns of the War. When hostilities began, the British had about twelve thousand men in Natal, and small forces at Kimberley and other points. At the outset the Boers seemed to have a decided advantage. British forces were shut up in Ladysmith, Mafeking and Kimberley, but the other troops were unable by their successes in the field to offset these reverses. A large addition was at once voted to the English army in South Africa, and Sir Redvers Buller, on his arrival in Africa with reinforcements, at once moved to the relief of Ladysmith.

In December further reinforcements arrived under Lord Roberts, Lord Kitchener acting as his chief-of-staff. The British cavalry force also was increased, and thus one of the early drawbacks of the British was remedied. By the last of February, 1900, the sieges of Kimberley and Ladysmith had been raised, the relief of the latter place giving rise to much of the hardest fighting of the war. From this time on the tide of fortune was on the side of the British. In March, Bloemfontein was taken, and while there Roberts proclaimed the Orange Free State British territory, under the name of the Orange River Colony.

The British force then moved toward Pretoria, taking, en route, Kroonstadt and Johannesburg; in June Pretoria was occupied. President Kruger fled at the occupation of Pretoria. The three months which followed the capture of Pretoria were devoted by the British to an attempt to capture all the Boer forces in the neighborhood, and by the first of August it seemed as if all organized warfare, had ceased. Roberts, therefore, issued a proclamation in September, 1900, declaring the South African Republic British territory under the name of the Transvaal Colony.

In spite of their reverses in fortune, the Boers refused to make peace and a constant guerrilla warfare was carried on under De Wet and Botha. Kitchener, who had been left in command on Roberts' return to England, gained for himself much unpopularity by gathering into large camps, called concentration camps, the Boer women and children, and compelling them to live under conditions which caused much sickness and death. By May, 1902, the Boers had been forced to the point of exhaustion, and they accepted the peace on which England insisted.

The Terms of Peace. Peace terms provided that all Boers lay down their arms and acknowledge themselves subjects of Edward VII. In return, all prisoners outside of the colonies were to be sent back to their homes, and no action was to be taken against burgers for acts in connection with the war. Provision was also made for the teaching of the Dutch language in the public schools in all cases where it was desired by the parents, and its use permitted in court. It was also provided that the military administration of the two colonies was to be superseded by a civil government at the earliest possible moment.

Related Articles. Consult the following titles for additional information:

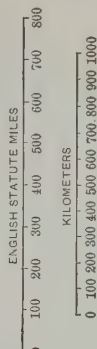
Boer	Ladysmith
Jameson, Leander	Orange Free State
Starr	Rhodes, Cecil John
Kimberley	Transvaal
Kitchener, Horatio	Union of South Africa
Herbert, Earl	
Kruger, Stephanus	
J. P.	



SOUTH AMERICA, the fourth largest grand division of the earth. It is the southern continent of America, or the New World, and is separated from North America in part by the Caribbean Sea and the Gulf of Mexico and is connected with it by the narrow Isthmus of Panama. Although the two continents have developed economically along decidedly individual lines, it is interesting to note that together they represent the world's great centers of democracy; no independent country in this vast expanse has a monarchical form of government.

Size and Location. South America is but little more than two-thirds as large as North

SOUTH AMERICA





Hammond's 8 x 11 Map of South America.
G.S. Hammond & Co., New York.



RELIEF MAP OF SOUTH AMERICA

America; it has much more nearly the regular shape of a triangle than has its northern neighbor. Its greatest length from north to south is about 4,800 miles, and from east to west it is about 3,300 miles. The area is 7,700,000 square miles, and it therefore occupies about one-seventh of the total land area of the globe.

Coast Line and Islands. Few gulfs or bays break the continent's remarkably regular coast line. The large indentations are on the north, the Gulf of Darien; on the northeast, the mouth of the Amazon, and on the southeast, All Saints Bay, the Bay of Rio de Janeiro, the mouth of the Rio de la Plata, Bahia Blanca, Gulf of San Mantias and Gulf of Saint George. There are few islands belonging to the continent. Those worthy of mention are Trinidad, off the northern coast, the Falkland Islands, east of the southern extremity of the continent, and the Galapagos, on the equator, west of Ecuador.

Mountains and Plains. There are three systems of mountains in South America, the greatest of which is the Andean Cordillera, or the Andes, on the Pacific coast, stretching in a continuous chain for over 4,000 miles, from Cape Horn to the Isthmus of Panama. Next to the Himalayas, in Asia, this is the highest mountain range in the world. Its loftiest peak is Aconcagua, reaching a height of 23,080 feet. Many of the Andean peaks are active volcanoes, and severe earthquakes are likely to occur throughout the chain. The second system is that of the highlands of Guiana, which lie north of the Amazon valley. Here are several irregular groups of mountains, about 2,000 feet high, which separate the plains of the Orinoco from those of the Rio Negro and the Amazon. The Brazilian highland, the third system, is very broad and is crossed by low ranges of mountains. Its average height is less than half that of the Andes.

From the configuration of its surface, the continent may be divided into five physical regions: (1) The low country skirting the shores of the Pacific Ocean, from fifty to 150 miles in breadth, and 4,000 miles in length; the two extremities of this territory are fertile, the middle is a sandy desert. (2) The basin of the Orinoco, a country consisting of extensive plains, or steppes, called *llanos*. This region is treeless, except for palms and mimosas which grow along the

streams and crown the low hills. In the rainy season this division is covered with grasses which afford fine pasturage, while in the dry season the heat is so intense that the region is hardly more than a desert. (3) The basin of the Amazon, a vast plain, embracing a surface of more than 2,000,000 square miles, possessing a rich soil and humid climate is covered almost everywhere with dense forests, which harbor innumerable tribes of wild animals and are thinly inhabited by savages, who live by hunting and fishing. (4) The great southern plain, watered by the Plata and the numerous streams descending from the eastern summits of the Andes; open steppes, which are here called *pampas*, occupy the greater portion of this region, which is dry, and in some parts barren, but in general is covered with a strong growth of weeds and tall grass, which feed large herds of horses and cattle and afford shelter to a few wild animals. (5) The country of Brazil, eastward of the Paraná and the Uruguay, presenting alternate ridges and valleys, thickly covered with wood on the side next the Atlantic, and opening into steppes, or pastures, in the interior.

Rivers. The three important river systems of South America are the Amazon, the Orinoco and the Plata. All of these rivers flow into the Atlantic. The Amazon, the largest river system in the world, drains nearly one-third of the continent. It rises in the Andes, is 4,000 miles long, and is navigable for about 2,300 miles. It has many large, navigable tributaries. The Orinoco rises in the Parima Mountains, and is 1,400 miles long. It is navigable throughout most of its course in the lowlands. The Orinoco and the Amazon systems are connected by a small river called the Cassiquiare. The Plata is formed by the confluence of the Paraná and the Uruguay rivers and is 185 miles long; at its mouth it is about 125 miles wide; the system is navigable for 1,000 miles. The principal smaller rivers are the São Francisco, the Rio Negro, the Magdalena and the Colorado.

Lakes. South America contains comparatively few large lakes. The largest, Titicaca, in the Andes, covers an area of about 500 square miles and is over 12,000 feet above the level of the sea. There are several small lakes in the mountain regions, but none is of special importance.

Mineral Resources. The mineral wealth of South America includes gold, silver and cop-



Paraguay Tea



Coffee



Cacao



Ipecac



Cinchona



Cassava



Vegetable Ivory



India Rubber

per, mined chiefly in the Andes; nitrate of soda, used as a fertilizer and in the making of gunpowder; mercury, diamonds and coal, as well as other valuable minerals. Chile is rich in copper and silver, and the coal mines give promise of great wealth. There are celebrated silver mines in Bolivia and considerable supplies of gold in Venezuela and Guiana. Some rich gold mines have been discovered in the southern part of Argentina. Brazil has extensive deposits of coal and iron. Previous to the discovery of the diamond field in South Africa, it was the chief source from which diamonds were obtained. Emeralds are also found in Venezuela.

Climate. Considering its extent in latitude, South America has a remarkably equable climate. The extremes of heat and cold which characterize North America are not found here. The northern portion of the continent, although lying within the tropical regions, has the intense heat greatly modified by its elevations, and some of the highest peaks in the Andes, even under the equator, contain snow throughout the year. The lowlands along the Orinoco, the Amazon and the coast of Brazil have a hot climate. The southern portion of the continent is free from sudden changes or extremes, because of the nearness of the oceans and the influence of the mountains along the western coast.

The rainfall is heaviest in the Amazon basin and diminishes toward the south, until the arid region, constituting a large part of Argentina and Patagonia, is reached. The southern portion has a damp climate, characteristic of the cool temperate regions. The seasons are just the opposite of what they are in the northern hemisphere, the summer occurring in December, January and February, and the winter in June, July and August.

Vegetation. The vegetable kingdom in South America has a magnificent development, particularly in the vast tropical territory east of the Andes, the basins of the Amazon, the Orinoco and their tributaries, where the genera and species are very abundant, the forests large and the forms gigantic. Besides palms, there are dye-woods of all sorts, cedar, mahogany and ebony; farther south are the araucarias of Chile and the beech forests of Argentina. There are numerous kinds of fruit trees, the fruits of which are usually very large and covered with

extremely thick shells. Among these may be mentioned the cannon-ball tree and the Brazil nut tree. Ferns and water lilies are also numerous and splendidly represented. The jungle, or undergrowth, in the forests is impenetrable in many places. Cinchona is found on the higher ground within the tropics. A holly is grown, the leaves of which are soaked in water and produce a beverage called *Paraguay tea*. During the rainy seasons the pampas and llanos are covered with a thick growth of grass and other vegetation.

Industries and Products. The leading industries of South America are herding, agriculture and mining. The pampas in the South and the llanos in the north furnish a wealth of pasture lands, while the valleys of the Plata River system, the southeastern part of the Brazilian plateau and the river valleys along the northern coast of the grand division constitute the great agricultural regions.

The selvas of the Amazon valley yield much of the world's supply of India rubber, as well as great quantities of Peruvian bark. Coffee, sugar cane, cotton, cacao, cassava and tobacco are the products of the torrid zone; while the temperate regions yield abundant crops of wheat, corn, barley and flaxseed.

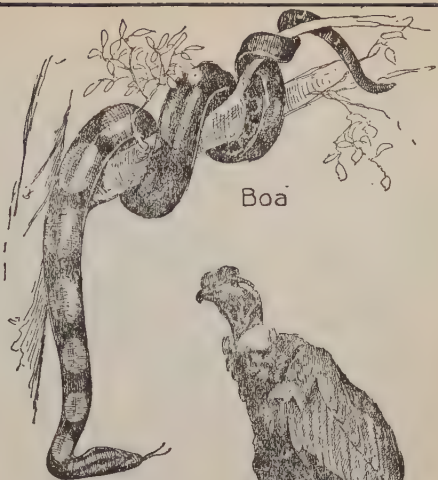
The foreign trade of South America is mainly with the United States and Europe. During the World War, when so many European countries were closed to commerce, the trade between South America and the United States was greatly stimulated. A better understanding between these two countries was developed, and with it came the opening of new markets which promise great commercial opportunities and advantages for the future.

South America's most valuable commercial commodities are coffee, rubber, wool, hides and nitrate of soda. The continent's most extensive railway system is in the southern section. A tunnel through the Andes affords railroad connection between the Plata and the Pacific, while the only commercial route in the central region is supplied by the Amazon and its tributaries. Many short railways interlink the Andes with the west and east coasts.

Animal Life. The zoölogy of South America is extensive and peculiar, embracing a fourth of all the known mammals, among which, however, are almost none of the wild animals so abundant in Africa and Asia.



Llama



Boa



Ocelot



Condor



Great Ant-Eater



Peccary



Tapir



Rhea

The most powerful of the carnivora is the jaguar, which is the only formidable beast of prey in the whole continent. In the selvas are found most of the animals living in trees, and with the exception of the tapir, jaguar, ant-eating bear and boa constrictor, they are small. Among these are monkeys, sloths, peccaries, many richly-colored but songless birds, and countless insects and reptiles. In the rivers are found alligators and the whalelike manatee. The armadillo is said to be the only wild animal that increases with the increase of population. Many of the species are peculiar to South America and are not found elsewhere. The llama, alpaca, vicuna and little chinchilla are found in the Andes; the llama is also used as a beast of burden. In the mountains the deer, bear, panther and the great condor are found.

Inhabitants. South America is more sparsely populated than North America. The densest population is found near the coast; the interior is thinly peopled, and chiefly by Indians. The aborigines of South America are undoubtedly of the same race as those of North America, as there exists a very striking general physical resemblance between the native races throughout the whole of the American continent, from Cape Horn to Bering's Strait. In South America these red men are far more numerous than in North America, and though many are half-civilized; a greater number are in a state of barbarism. A considerable portion of the population also consists of people of Spanish and Portuguese blood, and in addition there are a far greater number of mixed Indian and European blood, civilized and forming an important element in the various states of the continent. To these are now being added considerable numbers of Spanish and Italian immigrants.

Political Divisions. The political divisions, in their order from north to south, are Panama, Colombia, Venezuela, British Guiana, Dutch Guiana, French Guiana, Brazil, Ecuador, Peru, Paraguay, Uruguay, Argentina, or Argentine Republic, Bolivia and Chile.

History. Columbus first touched the continent at the mouth of the Orinoco in 1498. The next navigator to explore this continent was Hojeda, a Spaniard, who followed the coast from near the equator to Venezuela. He was accompanied by Americus Vesputius, who published the first account of the New World (see AMERICUS VESPUTIUS). Spain

and Portugal had almost entire control of the continent until the beginning of the nineteenth century. The Spanish colonies declared their independence in 1810, and after a ten years' war a number of republics were established. In 1823 Brazil became independent of Portugal and retained a monarchical form of government which lasted until 1889, when the form of government was changed to a republic. The only foreign possessions on the continent are those of British, French and Dutch Guiana.

South America was affected by the World War in much the same way as North America, as many of the republics on the southern continent suffered severely from the German submarine campaign. Brazil declared war on Germany on October 26, 1917, and Argentina, enraged by the insolence of a German diplomatic official, Count Luxburg, was all but swept into the conflict. Germany's disavowal of the attitude of the count prevented an actual rupture, but the allies had the sympathy of the majority of the Argentine people. Bolivia, Peru, Uruguay and Ecuador, manifesting their friendship for the United States, severed diplomatic relations with Germany before the close of 1917. While these nations could not take any decisive military part in the struggle, their attitude had a beneficial moral effect, and helped to stem the tide of German propaganda.

Related Articles. Consult the following titles for additional information:

POLITICAL DIVISIONS

Each Country is Treated in a Separate Article.

ISLANDS

Falkland Tierra del Fuego Trinidad

MOUNTAINS

Aconcagua Cordillera
Andes Cotopaxi
Chimborazo

RIVERS

Amazon Paraguay
Madeira Paraná
Magdalena Rio de la Plata
Orinoco Uruguay

MISCELLANEOUS

Inca Patagonia
Indians, American Titicaca, Lake
Llanos

SOUTHAMPTON, *suth hamp'ton*, ENGLAND, a seaport town, situated on a peninsula at the mouth of the Itchen River, on Southampton Water, an inlet of the English Channel. It is eighteen miles northwest of Portland and seventy-nine miles southwest of London, and is a favorite summer resort. Southampton was formerly a walled town, and some of the wall and several gates still remain. Among the important buildings are



Pottery



A Native Home



Dagger and Spear



An Indian Woman



POPULATION CHART
 ■ Native Races; Few White People.
 ■ European and American;
 Thickly Settled.



An Indian Man



Typical Open-Air Market Place

God's House, a hospital, and the churches of Saint Michael and Holywood. The town is the most important English seaport on the channel, and is a port of call and a coaling station. It is the seat of a university college established in 1850. From Southampton, in 1620, the *Mayflower* set sail for the New World, and in commemoration of this event a memorial tower was erected in 1914. Population, 1921, 160,997.

SOUTH AUSTRALIA, a state of the Commonwealth of Australia, occupying the south-central portion of the continent and extending from the Great Australian Bight, on the south, to the Northern Territory and Queensland, on the north. It is bounded on the east by Victoria, New South Wales and Queensland, and on the west by Western Australia. The Northern Territory was originally a part of South Australia, but was transferred to the Commonwealth in 1911. The area is 380,070 square miles, a little greater than that of the province of Ontario.

South Australia occupies a portion of the great Australian plain, and with the exception of some low mountains distributed over the state, the country is lowland and nearly level, rising by a gentle slope to a plateau of 600 to 1,000 feet in the interior. There are a number of shallow lakes, including Eyre, Torrens, Gardiner and Everard. These are partially salt. The Murray River flows through the southeastern part and is the only stream of importance in the state.

The climate is hot, but usually healthful. Along the coast there is considerable rainfall, but in the interior the rainfall is often not more than ten, and sometimes only five inches. For these reasons agriculture is confined chiefly to the southeastern section.

Agriculture forms the chief industry of the inhabitants. Wheat is the most important crop, followed by barley and oats. Large quantities of oranges, grapes and other fruits are grown, and the manufacture of wine has become an industry of considerable importance.

Copper, silver and gold are found in the mountains. The first gold mine in Australia was opened in South Australia, but copper is now mined in larger quantities than any other metal. Silver and lead are mined in small quantities, and iron, stone, phosphate rock, salt, kaolin, gypsum and other minerals occur. There are about 2,700 miles of railways in the state.

The executive department consists of a governor, appointed by the Crown, and a council consisting of six ministers and the chief justice of the supreme court. The legislature comprises two bodies—the legislative council, consisting of twenty members, and the house of assembly, of forty-six members, all elected by popular suffrage for three years, the right to vote being extended to women. Elementary education is free and compulsory upon children up to the age of thirteen. Adelaide is the capital. Population, 1921, 495,336.

Related Articles. Consult the following titles for additional information:
Adelaide Australia Murray River

SOUTH BEND, IND., the county seat of Saint Joseph County, eighty-six miles southeast of Chicago, on the Saint Joseph River and on the Grand Trunk, the New York Central, the New Jersey, Indiana & Illinois, the Lake Erie & Western, the Michigan Central and the Vandalia railroads. The University of Notre Dame and Saint Mary's Academy are located two miles north of the city. Some of the important institutions of South Bend are the Saint Joseph's Academy, the Northern Indiana Medical and Surgical Institute, two hospitals and ten banks. Other important structures are the Federal and county buildings, a city hall, a public library, and a Y. M. C. A. building. The city is surrounded by rich farming region and is the chief industrial center of Northern Indiana. It has the largest wagon factories in the country. Other manufactures are plows, clover hullers, sewing machines, flour, woolen goods, watches, cutlery, electrical appliances, and concrete blocks. The value of the annual output of all factories approximates \$60,000,000. The first white settlement was made by Alexis Coquillard in 1824. The town was incorporated in 1835, and the city was chartered in 1865. Population, 1910, 53,684; in 1920, 70,983.

SOUTH BETHLEHEM, PA., a borough in Northampton County, forty miles north of Philadelphia, on the Lehigh River, opposite Bethlehem, and on the Lehigh Valley, the Philadelphia & Reading, the Central of New Jersey and several electric railways. It has good transportation facilities, is near deposits of coal and iron ore, and contains extensive iron and steel works, machine shops, foundries, zinc and brass works, wood-working establishments and other factories. Lehigh

University is located here, and the borough also contains the Bishop Thorp Seminary for girls, the Saint Luke's Hospital, and public and school libraries. A part of borough of BETHLEHEM (which see) since 1910.



SOUTH CAROLINA, one of the South Atlantic group of American states, lying between North Carolina and Georgia and bordered for 190 miles by the Atlantic Ocean. In the city of Charleston it possesses one of the country's great ocean ports. The form of the state is roughly triangular, and it has an area of 30,989 square miles, which ranks it as the thirty-ninth state in size. In 1920 the population was 2,559,123, the state being twenty-sixth in population. Of this number 864,719 were negroes. In 1910 the Federal census announced the population as 1,660,934. The popular name of South Carolina is the *Palmetto State*.

Surface and Drainage. South Carolina has three natural divisions of surface, known respectively as the "low country," the "middle country" and the "up country." The first division consists of low lands along the coast, extending in some places a hundred miles inland. Most of this region is but a few feet above sea level, and low islands and salt marshes border the coast. The "middle country" consists of rolling land, broken occasionally by sandhills. Along the western border of this region is a belt of sandhills partially covered with pine forests, and known as the "Pine Barrens." Beyond this the country rises abruptly to the Piedmont plain. The "up country" includes the northern and western parts of the state, and is rich in minerals. In the northwest the Blue Ridge Mountains rise abruptly to a height of over 2,000 feet above the plateau; Mount Rich, in the northwestern part, with an altitude of 3,569 feet, is the highest point.

The drainage is to the southeast. The principal rivers are the Savannah, the Pedee, the Congaree and the Santee. Below the Fall Line these streams are deep and sluggish. At the Fall Line and above they furnish abundant water power, and cities with thriving manufacturing industries are found on them.

Climate. South Carolina has a delightful climate. The winters are short, seldom lasting longer than six weeks. The summers, while long, are not usually hot or enervating, and the nights are always cool. Snow falls only in the mountains. The average annual temperature is 63°; the average rainfall, 52.31 inches.

Mineral Resources. The mineral resources of South Carolina are extensive and varied. The mineral yielding the greatest income in years past has been phosphate rock, but its quantity has greatly decreased. Clay products are worth close to a million dollars a year. Considerable building stone is quarried, and gold is mined in a few localities; with an annual output of about \$7,500,000. There are also some silver and a little lead. Kaolin is found, and there are deposits of iron ore, marble, granite, asbestos, soapstone and mica. The mineral fuels include a little gas, petroleum and coal. There is granite in the Piedmont sandhills.

Agriculture. South Carolina is an agricultural state. The chief products are cotton, rice, tobacco, corn and oats. The state is fifth in the production of rice; it is third in the production of cotton, the yield being about 1,500,000 bales annually. The sea-island cotton is the best in the world, and it is produced in large quantities in the strip of islands near the coast. Corn is raised to the extent of 20,000,000 to 30,000,000 bushels a year; oats, about 4,000,000 bushels; wheat, about 600,000 bushels; tobacco, over 60,000,000 pounds. Truck gardening and fruit growing are rapidly developing industries. Watermelons are grown in abundance, peaches are cultivated in the Piedmont section, and olives and oranges grow along the coast. Among native fruits are apples, pears, quinces, plums, apricots, almonds and cherries. The hillsides of the Piedmont section are covered with fine vineyards. There are extensive pine and cypress forests in the mountain section and in the low country.

Manufactures. Nearly one-half the annual products of South Carolina now consist of

manufactured goods, and these are made in about 2,000 factories. Cotton manufacturing is by far the most important industry, the state being second among the Southern states in the value of cotton products. The manufacture of lumber and timber products ranks second. Other industries are the manufac-

Government. The legislature consists of a senate, containing forty-four members, elected for four years, one-half retiring every two years, and a house of representatives of 124 members, elected for two years. The executive department consists of a governor, a lieutenant-governor, a secretary of

SOUTH CAROLINA

THE PALMETTO STATE



State Seal



The Old Market at Charleston



Population of Cities

- ◆ 9,000 to 15,000
- ▲ 16,000 to 20,000
- 21,000 to 25,000
- ★ 30,000 to 40,000
- Over 60,000

A Rice Field



Calhoun's Home, Charleston



ture of fertilizers, of cottonseed oil and of naval stores. There are extensive fisheries at Charleston, Georgetown, Beaufort and Port Royal.

Transportation. The Savannah, the Pedee, the Congaree and the Santee are navigable to the Fall Line. The mouths of these rivers form good harbors, and there is an excellent harbor at Charleston. The state is well supplied with railroads, which traverse it from the northeast to the southwest and from the northwest to the southeast. The entire mileage exceeds 4,500 miles, and with the exception of the counties along the coast the state is well provided with railroad facilities. The lines are practically under the control of three systems, the Atlantic Coast Line, the Seaboard Air Line and the Southern. Charleston has an important foreign trade.

state, a comptroller-general, an attorney-general, a treasurer, an adjutant-general and a superintendent of education, each elected for two years. Numerous commissions and boards are named by the legislature or by the governor. The courts comprise a supreme court of one chief justice and four associates, elected by the general assembly for ten years, and a circuit court for each judicial circuit into which the state is divided. The judges for the circuit courts are elected by the legislature for four years.

Education. Marked improvement has been made in the school system within the past few years. Separate schools are maintained for the white and colored races. The South Carolina Historical Society, founded at Charleston in 1855, has a valuable library and some important manuscripts. The state

Items of Interest on South Carolina

South Carolina is the only state in which divorce is not allowed under any circumstances; this is a provision of the state constitution.

The tree and plant life is semi-tropical in character on the coast islands, where the palmetto, live oak, and magnolia are common; in the Coastal Plain the long-leaf pine predominates in the sandy regions while the cypress is commonest in the swamps; in the uplands, pines, oaks and hickories, as well as elms, maples, and chestnuts, are found everywhere.

Medicinal and flowering plants are abundant; a few of the former are ginseng, snakeroot, bloodroot, horehound and wild flax; of the latter the most prominent are jessamines, azaleas, lilies, roses, violets, honeysuckle and goldenrod.

Any officer, state, county, or municipal, "who, through negligence or connivance, permits a prisoner to be seized and lynched," forfeits his office and becomes ineligible to hold any public office or trust in the state unless pardoned by the governor; the county in which the crime occurs is, without regard to the conduct of the officer, liable for damages of not less than \$2,000 to the heir or representative of the person lynched, and the county is authorized to collect the amount from the persons engaged in the lynching.

Questions on South Carolina

What is the area of South Carolina?

Describe its surface.

What is the highest point in the state?

What are the principal rivers?

What is the character of the tree and plant life?

What percentage of the total area is covered by forests?

Name some of the common flowers, song birds and other animals.

How many farms are there in South Carolina?

What are the principal crops?

What is the most important product of the fisheries?

university is at Columbia. Among other institutions of learning for white students are the following:

Chicora College, Greenville.
Clemson Agricultural College, Clemson College.
Coker College, Hartsville.
College of Charleston, Charleston.
Columbia College, Columbia.
Converse College for Women, Spartanburg.
Erskine College, Due West.
Furman University, Greenville.
Greenville Female College, Greenville.
Lander College, Greenwood.
Newberry College, Newberry.
Presbyterian College, Clinton.
Winthrop Normal College, Rock Hill.
Wofford College, Spartanburg.
Women's College, Due West.

There are schools for the education of colored students at Denmark, Ermo, Rock Hill, Orangeburg, Abbeville and Columbia.

State Institutions. In 1915 a state board of corrections and charities was provided. It has supervision of a penitentiary and a reformatory for young negro boys at Columbia, an industrial school at Florence, a state farm at Boykin, a state hospital for the insane and an infirmary for Confederate soldiers, the latter two at Columbia.

Cities. There are seven cities in the state with populations exceeding 8,000. These are Charleston, Columbia, Spartanburg, Greenville, Anderson, Florence and Sumter. Columbia is the capital.

History. In 1562 French Huguenots settled at Port Royal, S. C., but the colony was dispersed by the Spaniards, and settlement was not again attempted in the territory for nearly a hundred years. In 1663 it was granted by the king of England to eight proprietors, and the first permanent settlement was made on the Ashley River, but it was later removed to Charleston. In 1729 the proprietors of the Carolinas, which had been governed together, sold their interest to the Crown, and the region was divided into two separate royal provinces.

During the eighteenth century, South Carolina maintained a semi-independence of the Crown and was aggressively patriotic during the pre-Revolutionary struggle, being the first state to form an independent constitution (May, 1776). Many of the most important battles of the war occurred within its borders, and it also furnished famous commanders, among whom were Thomas Sumter and Francis Marion. The Federal Constitu-

tion was ratified after somewhat bitter discussion, in May, 1788.

South Carolina was always strongly Anti-Federalist in sentiment, and it came into serious collision with the national government on the passage of the Clay tariff act in 1832, secession being averted only by compromise. It was the first state to secede preceding the outbreak of the Civil War (December 20, 1860), and the first battle of the war was fought at Fort Sumter in the following April. Though the voting population of the state was but 47,000, it furnished 60,000 men to the Confederate army, of whom one-fifth were killed. It refused to ratify the Fourteenth Amendment, but adopted a constitution allowing negro suffrage, and was readmitted to the Union, on June 25, 1868. It suffered especially under the carpetbag régime, the state debt being increased from five to twenty million dollars in five years.

Among recent incidents in its history have been the Charleston earthquake, August 31, 1886; a famous storm and tidal wave in 1893, and the South Carolina and West Indian Exposition of 1901 and 1902. It has been consistently Democratic in both state and national politics. In 1916 provision was made to organize the militia in conformity with national requirements. It was made a crime to sell a formula for intoxicating beverages or to dispose of distilling apparatus. Children may not work in factories until fourteen years of age.

Related Articles. Consult the following titles for additional information:

CITIES

Anderson	Columbia	Spartanburg
Charleston	Greenville	Sumter

HISTORY

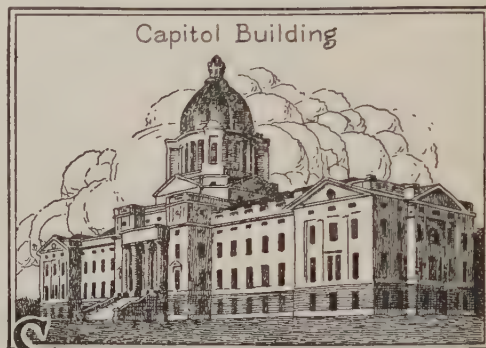
Calhoun, John C.	Ku-Klux Klan
Carpetbaggers	Nullification
Fort Moultrie	Reconstruction
Fort Sumter	States' Rights

PHYSICAL FEATURES

Blue Ridge	Piedmont Region
Fall Line	Savannah River

SOUTH CAROLINA, UNIVERSITY OF, a co-educational state institution located at Columbia. It was founded as the South Carolina College in 1801, and was opened in 1805. Before the Civil War it was one of the most advanced colleges in the Union. During the war the college was closed and the buildings were used as a hospital, first by the Confederates and later by the Federals. Reopened as a university in 1866, it was closed again after a few years in

consequence of unsettled political conditions, until 1880, when it was organized as a college. Since its last reorganization in 1906 as the University of South Carolina it has experienced rapid development, and now includes schools of art, science, engineering and law, a school for teachers and a graduate school, with also extended elective courses of study. The faculty numbers about forty, and there are over 600 students. The library includes about 50,000 volumes.



SOUTH DAKOTA, popularly called **THE SUNSHINE STATE**, because of its many bright, sunny days, is a great agricultural state of the American Union, belonging to the north-central group. Originally it was a part of Dakota Territory, the land of the Dakota tribe of Siouan Indians. The name Dakota is the Indian for *Allies*, and refers to the membership of the Dakotas in the Sioux Confederation.

Location and Area. South Dakota is bounded on the north and south by North Dakota and Nebraska, respectively. The Missouri River, which flows entirely across it in a general southeasterly direction, forms a portion of its boundary on the south. On the west South Dakota adjoins Montana and Wyoming, and on the east it borders on Minnesota and Iowa. In general it is rectangular in shape.

With an area of 77,615 square miles, of which 747 square miles are water, South Dakota is the fourteenth state in the Union in size. North Dakota is smaller by nearly 7,000 square miles, and Nebraska by ninety-five.

Population and Cities. In 1920, when it had 636,547 inhabitants, South Dakota was the thirty-seventh state in the Union in population. Germans, Scandinavians, Russians and Irish are the most numerous of the

foreign-born groups, who constitute about sixteen per cent of the population. In 1910, according to Federal census, the population was 735,434. There are six Indian reservations, with a total area of 670 square miles. In 1920 there were 16,384 Indians in the state.

The chief cities, in order of size, are Sioux Falls (population, 25,202), Aberdeen (15,537), Lead (5,013), Watertown, Mitchell, Huron and Yankton. Pierre is the capital.

Surface and Drainage. The surface for the most part is a gently-undulating prairie, rising from a plain east of the Missouri River to a plateau in the western portion of the state and to the Black Hills in the southwest. Two long and narrow tablelands, from 1,500 to 2,000 feet above sea level, covered in places with boulder-strewn hills, extend nearly north and south; one, the Coteau des Prairies, is near the eastern border, and the other, the Coteau du Missouri, lies just east of the Missouri River. Between these plateaus is the basin of the James River. West of the Missouri River the surface is more uneven, and hills and buttes are numerous. All of this region is drained by branches of the Missouri. The Black Hills region comprises an area of about 5,000 square miles, extending into Wyoming. The highest point is Harney Peak, 7,216 feet in altitude. The central zone is of granite, and around it are rows of hills made in the upturned edges of sedimentary rock layers.

To the southeast of the Black Hills are the famous Bad Lands, though the name is misleading, for it is simply the abbreviation for "bad-for-traveling lands," as the early French explorers called them. This region is made up of soft clays, marls, shales and sands, in which the forces of erosion have produced deep, steep-walled gulches and ravines, and numerous hills and buttes. In the broader valleys, where the slope is not so steep, nutritious grasses grow. The North Dakota bad lands extend into the northwestern part of the state. These clays are more highly colored and the scenery is more-beautiful than in the southwest.

The state is drained by the Missouri River system. The Missouri itself flows through the state in a southeasterly direction. Parallel to the Missouri and 100 miles east is its tributary, the James River. The remaining principal tributaries of the Missouri all enter from the west; in order, from north to south, they are the Little Missouri, the Cannon Ball,

the Grand, the Owl, or Moreau, the Big Cheyenne and the White. All the rivers flow toward the southeastern corner of the state, and a part of the eastern boundary is formed by the Big Sioux, on which Sioux Falls is located.

Climate. The climate, being continental, is characterized by extremes of heat and cold, but as the air is clear and dry, the heat of summer and the cold of winter are not so uncomfortable as in states to the east where the air is damp. The average annual temperature of the east half of the state is 44.5° of the west half, 45.6°. The mean annual rainfall for the eastern half of the state is 22.3 inches, and for the western half, 17.3 inches. The unusual amount of sunshine and the invigorating qualities of the air make the climate very healthful.

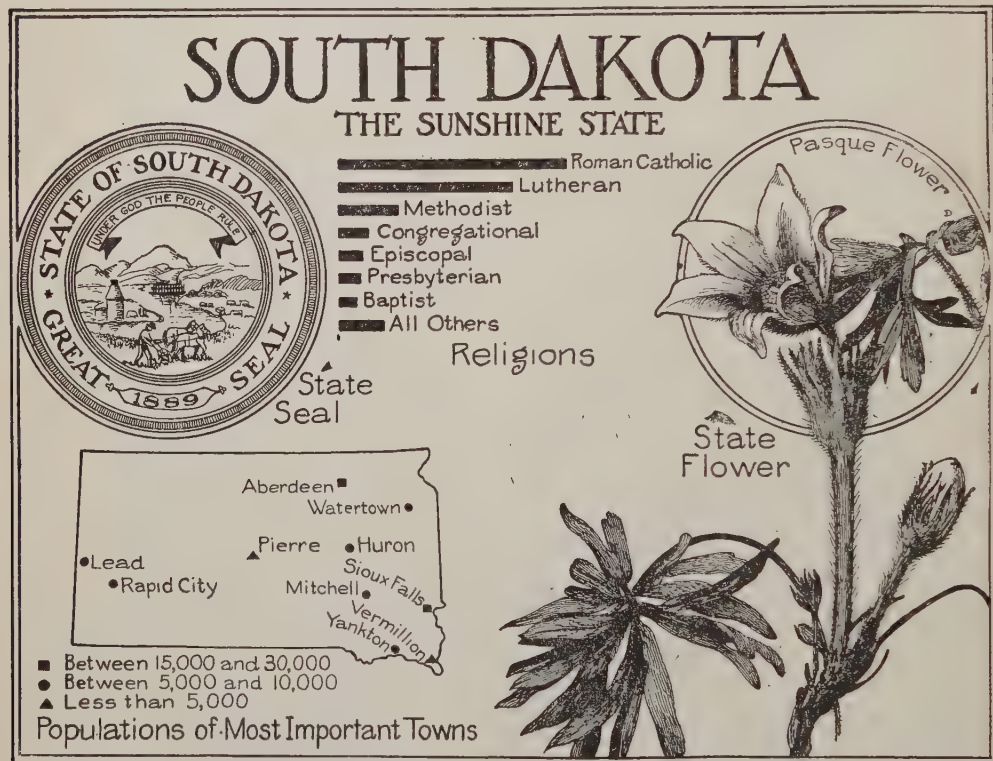
Mineral Resources. The Black Hills are said to comprise the richest 100 square miles on earth, yielding about one-twelfth of the gold produced by the United States each year, and giving South Dakota fourth place in the list of gold-producing states. The annual output now averages more than \$7,400,000. Silver, mica, lead, tungsten, tin, copper, iron, manganese, graphite, and other rare and valuable minerals are also found in this region. Here, too, are found valuable limestone, granite, sandstone, marble and gypsum. Excellent building and paving stone, called red quartzite, known also as Sioux Falls jasper, is quarried at Sioux Falls and Dell Rapids along the Big Sioux River. Cement is manufactured from the beds of chalkstone near Yankton, and great quantities of excellent brick and fire clays are found.

Agriculture. The rich plains of the eastern half of the state have been famous for years for wheat, corn and other farm products, and the grazing plains of the western portion for live stock. With the advent of railroads into the western plains and the application of improved "dry farming" methods, the entire state is fast becoming agricultural. Irrigation is practiced to some extent in the vicinity of the Black Hills, especially in the valley of the Belle Fourche River. Wheat and corn are the most profitable crops, and the acreage devoted to each is over three and one-half million. Oats, barley, potatoes, hay, flaxseed, apples and small fruits are also valuable products. In the production of spring wheat, South Dakota is one of the three leading states, the others being Min-

nesota and North Dakota; it is the fourth in the production of flaxseed, following North Dakota, Minnesota and Montana.

Manufacture. The chief manufacturing industries are connected with the agricultural activities, and include the making of butter, cheese and condensed milk, and flour and grist milling. Printing and publishing, the manufacture of lumber and lumber products

representatives of not fewer than seventy-five nor more than 135 members. The sessions are biennial and are limited to sessions of sixty days, except in cases of impeachment. The executive department consists of a governor, a lieutenant-governor, a secretary of state, a treasurer, a superintendent of public instruction, a commissioner of schools and public lands, a commissioner of insurance, an



and the production of various commodities for home needs are other lines of manufacture. Sioux Falls is an important meat-packing center. Between 1910 and 1915 the value of manufactured products increased over thirty-five per cent.

Transportation. Railroads reach all parts of the state, and new lines are being built in the newer sections. The total mileage is about 4,300. The important roads are the Chicago, Milwaukee & Saint Paul; the Chicago & North Western; the Chicago, Burlington & Quincy; the Illinois Central; the Great Northern and the Chicago, Rock Island & Pacific.

Government. The legislature consists of a senate of not fewer than twenty-five nor more than forty-five members, and a house of

adjutant-general and an attorney-general, all elected for two years. The courts consist of the supreme court, consisting of five judges elected for six years, and state district courts, one in each district, presided over by judges elected for four years. County judges are elected, one in each county, for two years. Capital punishment was abolished in 1915, and since then other progressive laws have been passed, including legislation prohibiting the liquor traffic, granting women the right to vote and providing for workmen's compensation.

Education. The state educational institutions are controlled by a board of regents consisting of five members appointed by the governor for a term of six years. These com-

Items of Interest on South Dakota

The Indian reservations are the Standing Rock, Cheyenne River, Lower Brule, Crow Creek, Pine Ridge and Rosebud.

The state is governed under its original constitution of 1889, but this has been amended several times.

South Dakota was the first state in the Union to adopt the initiative and referendum: under the constitutional amendment of 1898, on petition of five per cent of the legal voters the legislature must submit to popular vote at the next general election measures which they wish enacted as such, or measures already passed by the legislature which have not already become effective.

The governor's veto does not apply to laws passed by popular vote.

Elementary agriculture was added to the studies in all rural schools in 1909.

When the state was admitted into the Union two sections of land, 640 acres each, were set aside to be sold for school purposes.

The first national bank in the state was organized at Yankton in 1872.

The first authentic reports of explorations in the Dakotas were made by the Lewis and Clark expedition in 1804 and 1806; other explorers were John C. Fremont in 1838, and John J. Audubon in 1843.

The only extensive forest region is in the Black Hills, where there is a national forest reserve of 1,129,208 acres.

Questions on South Dakota

What is the area of South Dakota? How does it rank in size among the states?

What was the percentage increase in population between 1910 and 1918?

What is the origin of the name "Bad Lands"?

Describe the drainage system of the state.

What is the chief mineral, and what is the state's rank in its production?

How does South Dakota rank in the production of spring wheat? Flaxseed?

prise the state university, located at Vermilion; the state college of agriculture and mechanic arts, located at Brookings; the state school of mines, located at Rapid City; the northern normal and industrial school, located at Aberdeen; and three state normal schools, located at Madison, Spearfish and Springfield. There are also denominational schools of higher education. The common schools of the state are supported from the interest on the investment of funds derived from the sale of school lands, from a local tax, a general tax and from other sources. Attendance is compulsory for those between the ages of eight and sixteen.

Institutions. The leading institutions are the insane asylum at Yankton, a school for the feeble-minded at Redfield, schools for deaf mutes and blind at Sioux Falls, an institution for the blind at Gary, a soldiers' home at Hot Springs, a tuberculosis sanitarium at Custer, a reform school at Plankinton and a penitentiary at Sioux Falls.

History. For the early history of South Dakota, see NORTH DAKOTA, subhead *History*. The state of South Dakota was formed by the division of Dakota Territory in November, 1889, after a great immigration to the region had caused it to become important as a wheat-producing territory. Since its admission into the Union, the state has progressed rapidly along all lines of development.

Related Articles. Consult the following titles for additional information:

CITIES AND TOWNS

Aberdeen	Mitchell	Sioux Falls
Lead	Pierre	Yankton

HILLS AND RIVERS

Bad Lands	Minnesota River
Black Hills	Missouri River

HISTORY

Custer, George A.	Miles, Nelson A.
Lewis and Clark Expedition	Sitting Bull

SOUTH DAKOTA, UNIVERSITY OF, a coeducational state institution for higher learning, founded at Vermilion in 1882 under the name of the University of Dakota. When the territory was divided into North and South Dakota and these states were admitted to the Union, the name was changed to that which the institution now bears. The present organization includes a collegiate department, also colleges of law, medicine, music and commerce, and a preparatory department. The collegiate department has courses in classics, literature, civil and mechanical engineering and sciences, and it has control of the state geological survey. The faculty numbers over

sixty, and there is an enrollment of nearly 700 students. Its library contains over 31,000 volumes.

SOUTHERN CROSS, a constellation of the Southern hemisphere, consisting of four stars in the same relation to one another as the ends of a somewhat irregular cross. The lowest star of the group is of the first magnitude, the northern and eastern are of the second magnitude, and the western of the third. The imaginary upright bar of the cross points to the South Pole.

SOUTHEY, ROBERT (1774-1843), an English poet and miscellaneous writer, the son of a linen draper of Bristol. He was sent to Westminster School in 1788 and soon gave proof of distinguished talents; but he was dismissed in 1792 for a satirical paper on flogging, published in a school journal. Shortly afterward he entered Balliol College, Oxford, where he remained but two years. He formed an acquaintance with Coleridge, and they were married on the same day to two sisters; but the scheme for the founding of an ideal community on the banks of the Susquehanna, in the carrying out of which their marriage was the first step, failed for lack of funds. In 1804 Southey fixed his permanent residence at Greta, near Keswick, in the heart of the English lake district, where he had Wordsworth and Coleridge for neighbors. From this period his intellectual activity was untiring, and he continued for a period of almost forty years to issue annually at least one, and often several, works, besides contributing largely to different periodicals. A government pension of £160 (\$800) was allowed him in 1807, and this was increased in 1835 to £460 (\$2,300). In 1813 he was appointed poet laureate. Having lost his first wife, he married, in 1839, Caroline Anne Bowles, herself a writer of some eminence. Soon afterward he sank into a state of imbecility, from which he did not recover. Among his poetical productions may be mentioned *Joan of Arc*, *Thalaba*, *Madoc*, *The Curse of Kehama*, *Roderick*, *the Last of the Goths* and a *Vision of Judgment*. His prose writings, including his letters, are models of literary expression. *Life of Nelson*, *Life of Wesley*, *History of Brazil* and *The Doctor* are among those still read for their lucid and beautiful style.

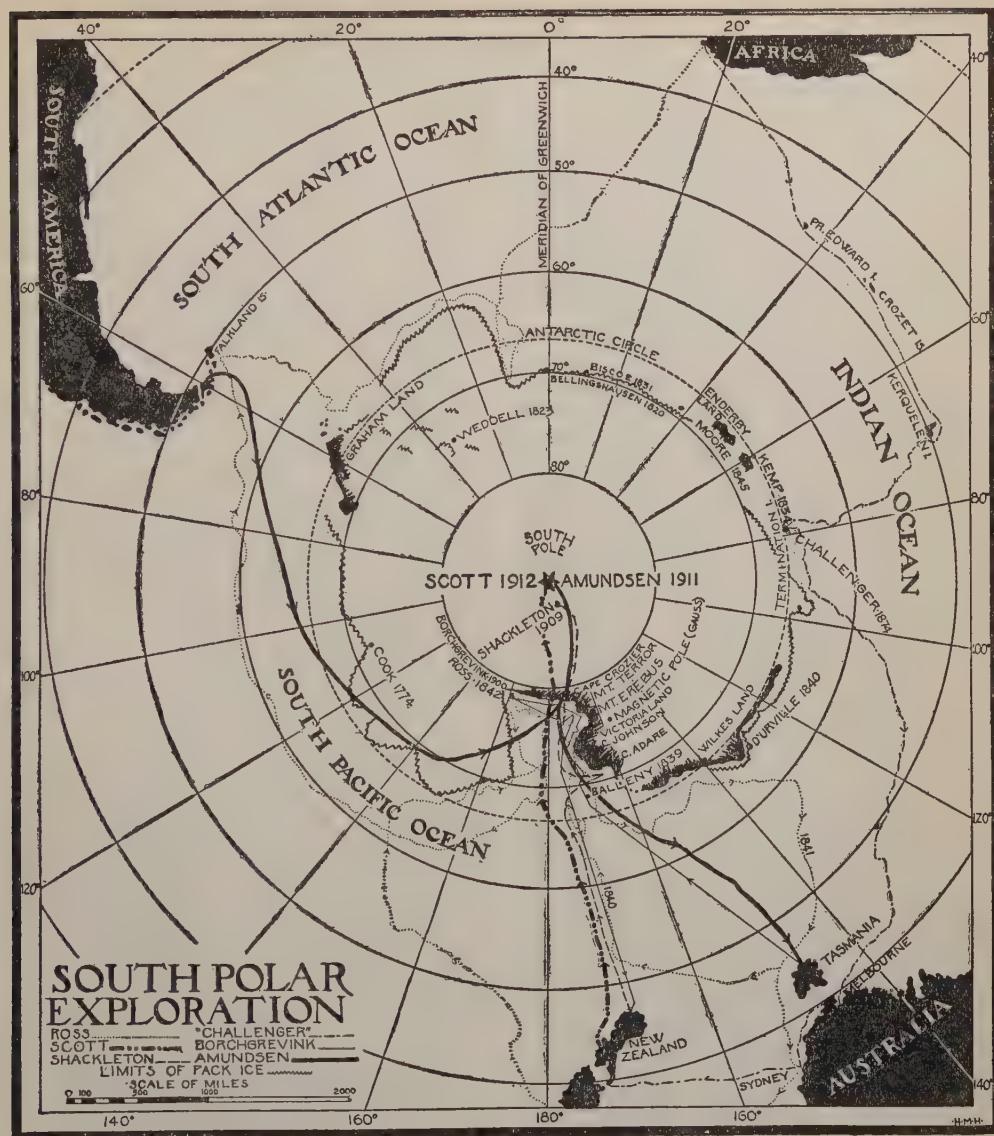
SOUTH MOUNTAIN, BATTLE OF, a battle fought September 14, 1862, near Sharpsburg, Md., between a Confederate force of 18,000

from Lee's Army of Northern Virginia and a Federal force of 28,000 from McClellan's Army of the Potomac. The Confederates were compelled to retreat, after offering a stubborn resistance, and took up a position along Antietam Creek, where another severe battle was fought September 16. The losses at South Mountain were, of the Federals, 1,800, of the Confederates, 2,600.



SOUTH POLAR EXPLORATION. Previous to the latter half of the nineteenth century comparatively little attention was given to exploration in the Antarctic regions. The first navigator known to have crossed the Antarctic Circle was Captain James Cook, who in 1773-'74 explored a portion of the land mass surrounding the South Pole. Later explorations confirmed Cook's discovery, and existence of the continent of Antarctica is now undisputed. While the shoreline of this great land mass has not been fully surveyed, it is estimated to have an area of over 5,000,000 square miles, making it about twice the size of Australia. It has an average elevation of 2,000 feet and mountains exceeding 15,000 feet in altitude. Different sections of this continent have been discovered by various explorers, each believing that he had found a separate land mass, and giving it a distinct name, so we find on the south polar maps Wilkes Land, South Victoria Land, King Edward VII Land, etc., all probably belonging to one great land mass.

Discovery of the South Pole. Captain Roald Amundsen, a Norwegian navigator, discovered the South Pole on December 16, 1911. Amundsen set sail from Norway in the *Fram* in 1910, with the intention of passing around Cape Horn, and entering the Arctic Ocean through Bering Strait, where he intended to spend several years in scientific investigation. But he changed his mind, and when he reached Cape Horn he turned southward. Reaching land in January, 1911, he established headquarters on the ice cap and lived there during the winter. Several supply stations were located on the route which the explorers were to follow. On October 21, Amundsen, with four companions, fifty-two dogs and four sledges, started for



the Pole, which was reached without mishap on December 16. Their journey was over a plateau from 3,000 to 11,000 feet high. Amundsen erected a tent at the Pole, and raised the Norwegian flag. He named the land King Haakon VII Plateau. The expedition reached headquarters January 12, after an absence of ninety-nine days.

Scott's Expedition. Captain Robert F. Scott of England, who in 1900 had made valuable explorations in the Antarctic regions, started on his second expedition at about the same time as Amundsen. Both

parties were striving at the same time to reach the Pole, though by different routes and unknown to each other. Scott reached the Pole January 18, 1912, where he found Amundsen's tent and flag. On their return to headquarters the entire party of five died from privation and exposure. The scientific results of this expedition were of high value.

Shackleton's Expedition. In 1909 Lieutenant (now Sir Ernest) Shackleton commanded an expedition which made valuable explorations in the Antarctic regions.

Shackleton ascended Mount Erebus, an active volcano, which he found to have an altitude of 13,379 feet and a crater 900 feet deep. On another journey Shackleton went within 111 miles of the Pole, when the company was compelled to turn back because of lack of supplies. Although Shackleton did not reach the Pole, it is generally conceded that his expedition solved the South Polar problem. Several side expeditions by Shackleton's party collected valuable scientific data. On his return he lectured to large audiences in the leading cities of the United States and Canada. A second expedition, from which he returned in 1917, had for its purpose the crossing of the Antarctic continent from Weddell Sea to Ross Sea. The expedition left Buenos Aires October 27, 1914, in the *Endurance*. Their ship was caught in the ice pack and was finally crushed and sunk. After enduring almost incredible hardships the party was saved by a reserve ship which Shackleton secured by making a voyage of 750 miles to New Zealand in a small boat.

Other Recent Expeditions. During the period covered by the expeditions described above, a number of other expeditions were made to the South Polar regions. While none made any new discoveries of striking importance, each contributed something of value to the knowledge of this vast unknown region, and the combined information obtained by them was of great value to geographic science.

Early Expeditions. Captain Cook is the first who is known to have sailed within the Antarctic Circle. He reached the southernmost point attained by him, on Jan. 30, 1774, 71° 10' south and 107° west. In 1821 Bellinghausen, the Russian, discovered Peter the Great and Alexander islands. Enderby Land and Kemp Land were discovered by Biscoe in 1831-1833. The first of these is the easternmost point of a supposed continuous coast and lies in about latitude 67° 30'. Sabrina Land and Balleny Islands were discovered in nearly the same latitude by Balleny in 1839. In 1840 two important exploring expeditions, one American, the other French, reached the Southern seas. The American expedition, under Wilkes, passed very near the southern magnetic pole, the position of which, at the time, he calculated to be 70° south latitude and 140° east longitude; it also traced land from longitude 154° 27' to 97° 30' east, which Wilkes concluded to be continuous. The French expedition,

under Dumont d'Urville, found traces of what they believed to be a continuous coast from 136° to 142° east, to which they gave the name of Adelie Land. An English expedition under James Clark Ross in 1839 passed the Antarctic Circle in about longitude 178° east, and in 172° 36' east longitude and 70° 41' south latitude he found a continuous coast, trending south, with mountain peaks 9,000 to 12,000 feet in height. He gave the country the name of South Victoria Land. In 77° 32' south latitude, 167° east longitude, he discovered an active volcano, Mount Erebus.

Related Articles. Consult the following titles for additional information:

Antarctic Ocean	Scott, Robert Fulton
Amundsen, Roald	Shackleton, Ernest H.

SOUTH SEA COMPANY, a company organized in England in 1711 by the lord treasurer Harley, with the exclusive right to trade in what was then known as the South Sea. In less than ten years after its establishment, the South Sea Company had taken over the entire national debt, which had by that time become £30,000,000. A number of the directors of the company began to dispose of their shares in 1720, and the weakened confidence which resulted from this, together with the failure of Law's Mississippi Scheme in France, brought about the collapse of the entire scheme. Thousands of shareholders were ruined. On investigation, the company was found to be fraudulent; the property of the directors was seized, and approximately a third of the original investment was returned to the stockholders.

SOVEREIGN, *sov'ur in*, a gold coin in current use in England, the value of which is £1, and the weight 123.274 grains troy. It is .916 pure metal. Half-sovereigns, 2-pound pieces and 5-pound pieces are also coined in the same proportion of weight and purity. The crown is equal to a quarter-sovereign. The sovereign of to-day bears the likeness of the ruler.

The sovereign is equivalent to about \$4.87 in United States and Canadian money.

Related Articles. Consult the following titles for additional information:

Crown	Guinea	Pound
Farthing	Penny	Shilling

SOVEREIGNTY, *sov'er in ti*. The word *sovereignty* is used in two different senses—to denote what is technically called *internal* sovereignty, that is, supremacy over the citizens of a state and to denote *external* sovereignty, that is, complete independence of any

other state. When used with reference to the internal affairs of a state, sovereignty may be either *legal* or *political*. The latter refers to the power which has ultimate control over all the state activities; thus, in the United States the people would be the political sovereign. Legal sovereignty refers to the organ of government which expresses the will of the political sovereign.

Characteristics of Sovereignty. Internal sovereignty has certain attributes: (1) It is *absolute*, that is, there can be no limitation upon its powers or activities. Practically, no government has absolute internal sovereignty, since every modern government is limited, either by a constitution or by some act or decree which granted rights which by prescription or for some other cause are now inviolable. (2) Sovereignty is said to be *indivisible*, that is, there cannot be two sovereigns with authority over the same territory. In a federal government either the whole people are the sovereign, and the state and central governments are the instruments of its sovereignty, or each state is a sovereign and the central government acts only in certain matters for the general good. An externally sovereign state theoretically is one which is absolutely independent of all other states. However, in practice this is impossible, and states which have practically surrendered every power in their relation to other states are still considered sovereign. See STATE; GOVERNMENT.

SO'VIET, a Russian term meaning *committee*, or *local council*, which came into general use at the time of the revolution which overthrew the imperial government. When the czar was forced to abdicate, soviets by hundreds came into existence over the country, in villages, factories, among the soldiers, etc. These soviets assumed authority as administrative bodies, and in course of time they became the real source of power, forcing Kerensky out of the government and giving the leadership to Lenine. The Russian soviet government is the executive committee of a vast number of village, town and city soviets. For details of this movement, see RUSSIA, subhead *The Soviets*.

SOWING, *so'ing*, **MACHINE**, **SEEDER**, or **DRILL**, a machine for planting grain. Among the simplest and earliest forms of this machine is a cylindrical vessel, with small holes at regular intervals around its circumference. This was used for sowing

round seeds, such as turnip seed. The machine was placed on wheels and was drawn over the land at a regulated speed; by its mere rotation the seed was delivered with considerable uniformity. A later pattern of machine had a fixed seed box, from which the delivery of the seeds was regulated by a revolving brush.

The pattern of seeder in most common use for wheat, oats and other small grains is the *drill*. This consists of a narrow box, eight or ten feet long, with circular openings in the bottom, from three to four inches apart. Connected with each of these openings is a hollow iron tube, extending down to the ground. In front of each tube is a device for making a small furrow, called the *lister*, consisting of two thin, flat pieces of steel, which meet in front and turn upward with a curve. Back of each lister is a wheel or other device for covering the grain. The box contains a revolving brush, for the purpose of distributing the grain evenly through the holes in the bottom. This can be gauged so as to allow any quantity to pass through and is thus adaptable for the sowing of different grains. As the machine is moved forward the brush revolves, and the grain falls through the drills into the furrows. A team of two horses can operate one of these drills, and on good ground it will seed from eight to ten acres in a day.

SOW THISTLE, *sou this'l*, a European weed belonging to the composite family, several species of which have been introduced into America. In parts of Europe it is used by the peasantry as a vegetable. The most common species grows to a height of two or three feet and has a branching stem and small yellow flowers, about three quarters of an inch in diameter. It spreads very rapidly, by means of its creeping roots and light seeds, blown about by the wind, and is a nuisance in pastures and grain fields. It can be eradicated only by careful cultivation and by planting other crops to smother its growth.

SOY BEAN, a bushy plant from two to four feet high. In Asia, where it is native, and especially in China and Japan, it constitutes an important article of diet, being used in the preparation of a number of fermented products, such as tofu cheese, which there takes the place of meats and other expensive nitrogenous foods. In America and in parts of Europe the soy bean is cultivated chiefly as a forage plant. As fodder the

plant, when cut at the proper time and cured, has a high food value. If the soy bean is planted for fodder the seed is sown broadcast and the plant is cut while in bloom; if it is planted for beans, the seed is sown in drills about three feet apart, and the plant is cut just before time for the pods to burst and scatter the seeds. From eight to ten bushels an acre is an average yield for green forage, while fifty bushels and more of seeds can be produced from an acre.



SPAIN, a kingdom of Southwestern Europe. Both geographically and historically it forms a connecting link between Europe and Africa. To the latter continent it was once attached, and now nearly touches it. Of all the countries of Europe, Spain has most persistently preserved its local differences of race and language; of all European countries it presents the most striking contrasts and the greatest diversity of land and people.

Parched, treeless plains are broken by bleak, rocky uplands and ragged sierras. There are luxuriant fields and gardens crossed by winding streams, and, again, barren regions of perpetual snow. Fiery summer heat alternates with biting winter cold.

The people of the several sections are as unlike as the land. Spain, once the most powerful nation of Europe, abounds in relics of its glorious past—a past made resplendent by mighty conquests, vast wealth and brilliant achievement. It has not kept pace with material progress, but is to-day one of the most fascinating countries of the continent—a land of beauty and romance, of quaint tradition, of picturesque customs and manners.

Location and General Features. Spain occupies about six-sevenths of the Iberian peninsula, and has an area of 190,050 square miles. With the Canary and Balearic islands and the possessions on the north and west coast of Africa, it has an area of 194,783 square miles. Its southern and eastern shores are washed by the Mediterranean Sea, its northern coasts by the Bay of Biscay. In the northwest and southwest it meets the At-

lantic, but along most of its western boundary Portugal intervenes to separate it from the sea. France forms less than half of its northern boundary.

The Land and Waterways. The predominating feature of Spain is a great interior plateau, which occupies about three-fourths of the peninsula. This plateau has an elevation varying from 1,000 to 3,000 feet, and is for the most part treeless. It is crossed by numerous mountain ridges, called *sierras*, the most important of which are the Sierra de Guadarrama and the Sierra de Gredos. At its northern limits rise the Cantabrian Mountains, and at its southern boundary are the Sierra Morena. The loftiest mountains wholly within the country are the Sierra Nevada, in the south, the loftiest peak of which is Mulhacén (11,664 feet), the highest point in Europe outside of the Alps and Caucasus. In the Pyrenees, which form a mighty barrier in the north, the highest summit in Spanish territory is Pico de Aneto (11,160 feet). The elevated land reaches to the sea in many places along the southeastern and eastern shore, terminating in cliffs. Alternating with these are great curving beaches. The northwestern shores are deeply indented, while in the southwest the coast is mostly marshes and sand dunes.

The rivers of Spain are of comparatively little economic value. Few are navigable, and all are too far below the general elevation to be useful for irrigation. All the long rivers except one discharge into the Atlantic. The Douro and Tagus flow west across Portugal. The Guadiana, which forms part of the Portuguese boundary, and the Guadalquivir, the deepest stream in Spain, which crosses the great Andalusian plain, both enter the sea on the southwest. The Ebro, which crosses the great plain of Aragon, draining the northeastern section, flows into the Mediterranean. There are no lakes of importance; the largest is Albufera, near Valencia.

Climate. The widest range of temperate climate prevails. There is not only great variation between seasons, particularly in the tablelands, but also extreme changes between the temperature of the days and nights. In the central parts the rivers freeze in winter, while in summer the temperature often rises to 107 degrees. In the hot season the rivers, owing to insufficient rainfall, run low or become dry, and the ground becomes so

parched that whole communities sometimes have to move. Southern Spain is delightful in winter, when rainfall and temperature combine to produce a subtropical vegetation. In summer this region is visited by the *solano*, a hot south wind which often blows for two weeks without ceasing. The northwestern provinces, on the Atlantic, have a moist and equable climate.

People. The Spanish are a bright and vivacious people, most of them dark-skinned and short of stature. They have been called idle, impractical dreamers, accused of vanity and love of show; but, though they shun the slavery of constant labor, they are nevertheless energetic and ambitious. Dreamers they may be, with vivid imaginations for magnificent projects they cannot execute. They esteem themselves highly, but are quick to see merit in others and defects in themselves. The love of pomp and splendor is but a natural heritage of a people with so splendid a past. The dominant characteristics of the typical Spaniard are independence and personal dignity. Under ordinary circumstances he is courteous, affable and witty, with a freshness of speech delightful to foreigners. He is nearly always violent in his loves and in his hatred.

The Spanish people are of a strongly individual character. They have preserved through the centuries the strain of the Iberians, the original inhabitants of the peninsula, only slightly modified by Roman, Teutonic and Berber invasions. The population is smaller than that of any other country of equal opportunity for growth. According to the latest census (1920) it is 21,347, 335. A large percentage lives under rural conditions. Madrid, the capital, and Barcelona are the largest towns, each with a population of over 500,000. Valencia, Seville, Malaga, Murcia, Saragossa, Cartagena and Bilbao are important centers, each with a population of more than 100,000.

Education and Religion. Education in Spain has not kept pace with the general trend of educational advancement. However, since 1901, when it was found that sixty-six per cent of the people were illiterate, far-reaching reforms have been in progress. The law of compulsory attendance has been enforced, more primary schools have been opened, more teachers engaged and at better salaries. The secondary schools, of which there are about sixty, prepare for the univer-

sities; the largest is in Madrid. The government also maintains commercial and technical schools and inspects regularly schools under private ownership.

The national church is the Roman Catholic. All the clergy, religious buildings and institutions are supported by the government. The numerous religious Orders, through their schools and charitable institutions, exercise a powerful influence on the life of the people. Among the small percentage of the people who do not adhere to the Catholic faith, there are 7,000 Protestants, 4,000 Jews, and a few others.

Language and Literature. Spanish is one of the Romance languages, being derived directly from ancient Latin. Three dialects are spoken—the Galician, in the northern provinces, the Catalan in the south and southeast, and the Castilian in the central part of the country. The last is the language of the court and of the Spanish-American republics.

Spanish literature began, like the literature of most other countries, in songs descriptive of the great deeds of heroes. The earliest of these songs which is extant is one on the Cid (see CID, THE), the manuscript of which dates from the fourteenth century. Fiction writing began in the fourteenth century, and from that century or the next dates the *Amadis of Gaul*, the most famous of medieval romances. The Golden Age of literature in Spain began in the sixteenth century, and lasted until the second half of the seventeenth. Of the scores of famous men who wrote during this period, the greatest were the poets Calderon de la Barca and Lope de Vega, and the novelist Cervantes (see CERVANTES SAAVEDRA, MIGUEL DE). Literature declined in Spain during the late seventeenth century, and the eighteenth century produced few writers of note. The imitation of French literature, which grew up in the latter half of the eighteenth century, had in some ways beneficial effects, as in the drama particularly there were productions of worth. The romantic movement which swept over Europe in the early nineteenth century affected Spain with the other countries, and poets, as well as prose writers, showed its influence. Of the last half of the nineteenth century the most notable literary form in Spain was the novel. A novelist of present-day fame is Vicente Blasco Ibanez, whose *Four Horseman of the Apocalypse*, a story of the World War, was a "best-seller" in America in 1919.

Art. See PAINTING.

Mineral Resources. Spain is one of the richest countries of Europe in mineral resources. It produces more lead, copper and quicksilver than any other country on the continent. Other minerals that are abundant are iron, salt, silver and coal, and there are valuable deposits of zinc, manganese, sulphur and phosphorus. Platinum was discovered there in 1915. Before the discovery of mercury in California, Spain had the most productive mercury mines in the world. These and salt mines are the only mines owned and operated by the government. Most of the others are worked by foreign companies, but many are as yet undeveloped. The yearly output amounts approximately to \$75,000,000.

Agriculture. About ninety per cent of the land is productive, but quite half of it is uncultivated, and in most sections farming methods and implements are most primitive. This condition is due largely to the system of land tenure, and partly to the inadequate means of communication. For centuries the land has been held in large estates owned by the nobility and rented to tenants at high rates. Within recent years the government has attempted, through an agricultural commission, through schools of farming and through irrigation, to promote the industry. Some of the large estates have been divided and sold to farmers on reasonable terms.

There are several distinct agricultural districts, which, owing to surface and climatic differences, have widely diversified interests. In the southern provinces, bordering on the Mediterranean, known as the gardens, every part of available ground is brought under tillage. The land is terraced, fertilized and irrigated by canals supplied from reservoirs. Large crops of oranges, lemons, grapes and other fruits are produced. In the extreme south almonds, figs, date palms, bananas and sugar cane are cultivated. In the interior the intense heat and dryness interfere with the successful pursuit of agriculture, and there are large areas of waste land. The northwestern provinces have diversified farming interests, and stock-raising is profitable. Here the fruits common to Central Europe are cultivated in abundance, and wheat, barley, oats, rye and other cereals are grown. One of the chief crops of Spain is the vine, grown in every province. Not only are large quantities of grapes and raisins exported, but

millions of gallons of wine. Hundreds of acres are planted in olives. Spain is the home of the Merino sheep, large numbers of which are raised.

Although the fisheries are important, they fail to supply the home demand, and the importation of fish is large. The catch consists chiefly of sardines, tunny and cod.

Manufactures. The manufactures are limited and are not sufficient to supply the home demand. Catalonia, in the northeastern part of Spain, is the leading manufacturing province. Following this, in the order of importance, are the districts of Galicia, Asturias and Vizcaya, which have an abundance of water power. A few of the large towns in the interior, including Madrid, Seville and Toledo, also have some manufactures. Barcelona is the chief manufacturing city of the country, and the leading industries include the manufacture of textiles, metal, paper and leather, and lace making. The provinces Valencia, Murcia and Andalusia manufacture some silk and woollen goods. The manufacture of tobacco is of importance in Madrid, Seville, Valencia and other towns. There are also manufactures of gold and silverware, jewelry, sugar, olive oil, cork, glass and porcelain.

Government. By the constitution of 1876 Spain is declared a constitutional monarchy. The executive power is vested in the king and the legislative power in the national legislature (known as the Cortes) and the king. The Cortes consists of a Senate and Chamber of Deputies. Of the 360 Senators, eighty sit by right of royal or noble birth or official position, 100 are appointed by the crown and 180 are elected by a limited suffrage for a term of five years. The terms of one-half of the elective class expire every five years; but on dissolution of the Cortes by the king the terms of all expire. The king may dissolve the Cortes at any time, but must assemble another within three months. The Deputies, of whom there are 406,—one for every 50,000 people,—are also elected for five years. Senators and Deputies have equal authority. Since 1907 voting has been compulsory.

Each of the forty-nine provinces has its own parliament, and each commune its elective assembly; neither the king nor the Cortes has the right to interfere in local government in the provinces except where the general interest is concerned.

Army and Navy. Military service is compulsory. The total liability for service is eighteen years. In time of peace the field army numbers over 200,000, officers and men; in time of war it may be increased to 300,000. From the army are recruited the Civil Guards and the Carabineros, the former a constabulary, the latter a military police who act as customs guard on the frontier. After the outbreak of the World War an army aeronautic department was created.

The navy is not strong as compared with other European navies. Since the Spanish-American War it has been in process of rebuilding. The program approved in February, 1915, provided for cruisers, gunboats, destroyers, submarines, mines and new repair docks. In 1922 the strength of the navy was fixed at 12,780 sailors and 4,605 marines.

Colonies. All of Spain's colonial possessions are in Africa or adjacent to its shores. They include Rio de Oro and Adrar, on the Sahara Coast; the Muni River settlements, on the banks of the Muni and Camp rivers and the Gulf of Guinea, also called Spanish Guinea; and the islands of Fernando Po, An-nobon, Corisco and the Elobey Islands in the Gulf of Guinea. These possessions are a liability rather than an asset, costing Spain \$400,000 a year. Politically the Canary and Balearic Islands are regarded as an integral part of Spain. Rio de Oro and Adrar are administered by the governor of the Canary Islands; the other possessions are governed from Santa Isabel, capital of Fernando Po.

History. When the Phoenicians landed in Spain and began colonization, probably at the end of the twelfth century B. C., they found the country inhabited by a race of mingled Celtic and Iberian stock, to whom the name Celtiberians has been given. After the Phoenicians came the Greeks, but the history of Spain did not really begin until the third century B. C., when the Carthaginians conquered almost the entire peninsula. Hamilcar Barca, Hasdrubal and Hannibal were the three great generals who established the empire of Carthage in Spain. As a result of the Punic wars, the Carthaginians were driven from Spain and the Romans came into possession of the territory. Not until 19 B. C., however, was the entire peninsula brought into subjection to Rome. Three provinces were formed from the conquered territory, and these were prosperous and powerful under the Roman rule.

In the early part of the fifth century, A. D., the Visigoths entered Spain and there established a kingdom. For three centuries the Gothic rule continued, but in 711 the Arabs overthrew the Visigothic king and made the greater part of Spain a dependency of the caliph. Gradually, in the mountainous districts of the Pyrenees, independent Christian kingdoms were established, and these small states were constantly at war among themselves for supremacy. In the eleventh century, Aragon and Castile emerged as the most powerful, and little by little they absorbed the other states. Fortunately for these two new powers, the Omniad dynasty of the Moors, which had been in power for almost three centuries, became extinct in the eleventh century, and the subsequent division of the Mohammedan territory into small independent states favored the expansion of the Christian states. By the early part of the thirteenth century the Moorish dominion in Spain had been almost entirely overthrown by the united efforts of Castile, Navarre and Aragon, and even the Kingdom of Granada, the only Moorish kingdom which remained, was forced to admit the supremacy of Castile in all matters affecting the two provinces.

By the marriage of Isabella of Castile to Ferdinand of Aragon, these two countries were united (1479), and they were thus enabled to undertake the conquest of what remained of Moorish power in Spain. After a ten years' war, Ferdinand and Isabella in 1492 entered Granada, the Moorish capital, and thus became the sovereigns of all Spain, with the exception of Navarre. Twenty years later Navarre, except the part north of the Pyrenees, was also taken by Ferdinand, and all Spain became united under one ruler.

The next hundred years was the period of Spain's greatest glory. The discovery of America opened up new opportunities for the growth of the kingdom. The grandson of Ferdinand, Charles V, gained to the country the Netherlands and Milan. In time Mexico, Peru, Central America, Venezuela, Cuba, Chile, Jamaica and Santo Domingo were conquered, and these poured into the royal treasury a stream of wealth. Parts of Africa were also conquered, and the Spice Islands, Malacca and the Philippines were acquired. The European territory added included Portugal, Naples, Sicily, Sardinia, the Canary and Balearic islands. Spain was then the most powerful nation of Europe.

The tyranny and bigotry of Philip II, son of Charles V, and of his successors, Philip III and Philip IV, were among the immediate causes of the decline of Spain. Religious persecution, civil wars and insurrections seriously weakened the kingdom. The loss of The Netherlands was a great blow to the country, and the wars with England worked great damage to the Spanish navy. With Charles II (1665-1700), the Hapsburg dynasty became extinct in its male line, and only by the disastrous War of the Spanish Succession were the claims to the throne settled. At the close of the struggle Philip of Anjou was recognized as king and ruled as Philip V, the first of the Bourbon line in Spain. The war had hastened the decline of Spain, by depriving it of many colonial possessions, including Parma, Naples, Sardinia, Milan, Sicily, Gibraltar and Minorca.

Ferdinand VI (1746-1759) and Charles III (1759-1788) both introduced reforms into the government and strengthened the state somewhat, but Charles IV (1788-1808) was not as strong a ruler as his two predecessors, and all that had been gained under them was lost. War with France brought heavy losses and conflict later with England as an ally of France ended in defeat at Trafalgar (1805). In 1808 affairs had come to such a state that Charles felt that safety for himself and for Spain lay only in his abdication, and he therefore gave up the throne to his son Ferdinand. Napoleon compelled Charles and Ferdinand to renounce all claims to the Spanish crown, which he conferred on his brother, Joseph Bonaparte. The Spanish people refused to recognize the Bonapartes as their rulers and declared for Ferdinand, and the active resistance which followed on their declaration was the first step toward Napoleon's overthrow. In 1814 Ferdinand again entered Madrid as king, and a reactionary policy was immediately adopted by him. From this time until 1868 the Bourbon dynasty reigned uninterruptedly, and liberals and absolutists in turn held the chief power in the State. In 1868 a revolt arose, headed by Prim, and the queen, Isabella, was driven from the country.

The attempt of the Spanish to find for themselves a ruler, led indirectly to the Franco-German War. From December, 1870, to early in 1873, Amadeus, son of Victor Emmanuel of Italy, reigned as king at Madrid, and after his abdication a republic

was organized. The republic proved unpopular, and in 1875 the monarchy was reestablished, with Alfonso XII, son of Isabella, as king. Alfonso reigned for ten years, and his posthumous son, Alfonso XIII, succeeded him, with Christina, his mother, as regent. A rebellion in Cuba was met with the greatest severity, and complications ensued which led, in 1898, to war with the United States, the result of which was the loss to Spain of Cuba, Porto Rico and the Philippine Islands. General political unrest and distrust of government officials led to a bloodless revolution in September, 1923. The military chiefs assumed control of affairs. King Alfonso yielded, and General Primo de Rivera was made practical dictator of Spain.

Related Articles. Consult the following titles for additional information:

CITIES

Barcelona	Cordoba	Murcia
Bilbao	Granada	Saragossa
Cadiz	Madrid	Seville
Cartagena	Malaga	Valencia

HISTORY

Alfonso XIII	Isabella of Castile
Alhambra	Maria Christina
Alva, Duke of	Moors
Aragon	Napoleon
Armada	Navarre
Castile	Peninsular War
Charles V (Holy	Philip II and V
Roman Emperor)	Spanish-American War
Ferdinand V	Succession Wars
Gonsalvo de Cordova	Torquemada, Thomas
Granada	de
Hamilcar Barca	United States, subhead
Hannibal	History
Iberia	

ISLANDS

Canary	Balearic
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MOUNTAINS

Pyrenees	Sierra Nevada
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RIVERS

Douro	Guadiana
Guadalquivir	

SPANIEL, *span'el*, the name given to several breeds of dogs which include field and water hunting dogs, and several smaller breeds of the fancy, or "toy," variety. They are characterized by a rather broad muzzle, remarkably long, full ears, plentiful and beautifully-waved hair. The prevailing colors of most breeds are liver and white, although some are red and white, black and white, or deep brown or black on the face and breast, with a tan spot over each eye.

Kinds of Spaniels. The Irish breeds constitute the best known water spaniels. Among the most popular field hunting spaniels are the *Clumber*, *Sussex*, *Norfolk* and *Cocker*. The *King Charles*, a small variety, common as a lapdog, is usually black and tan or brown and has a large head and a small, well-coated body. In addition to the King

Charles, the *Blenheim* and the *Japanese* are well-known lap spaniels. The *Maltese* is also a small species of spaniel. The *water spaniels*, large and small, differ from the common spaniel only in the roughness of their coats. They are fond of the water and make excellent retrievers. Their intelligence, affection and obedience, combined with their beauty, make spaniels highly prized as house dogs. See Dog.

SPANISH-AMERICAN WAR, the war between Spain and the United States in 1898, was of short duration, but important in its effect upon the history of the world.

Cause of the War. The war's fundamental cause was the inability or unwillingness of Spain to govern Cuba according to principles of freedom and justice. It was a result of nearly a half-century of disagreement and negotiation, during which the United States often had proposed to purchase the island, in order to remove the menace to American industries and peace, while the island itself had been in almost constant turmoil from rebellion and accompanying oppression. The last insurrection began in 1895, and despite the most determined efforts of Spain, through severe measures undertaken by its governors-general, Campos, Weyler and Blanco, the Cubans had succeeded in establishing a semblance of an independent government and had maintained more or less successful warfare against the Spanish army.

Declaration of War. The interest of the United States government became more and more centered upon Cuban affairs, and finally the United States battleship *Maine* was sent to Havana to protect American interests. On the night of February 15, 1898, the vessel was destroyed by an explosion. Though responsibility could not be placed upon Spanish officials, the American people were convinced that it was the result of a deliberate plot, and public sentiment forced Congress soon to declare war (April 25). Meanwhile, it had declared that "the people of Cuba are and of right ought to be free and independent," demanded that Spain relinquish her authority in the island, and authorized President McKinley to use the army and navy of the United States to accomplish that end.

Naval Engagements; Campaigns. The first gun of the war was fired April 23 by the *Nashville*, in the capture of a Spanish merchantman. Commodore Sampson, with

the North Atlantic naval squadron, began a blockade of Havana and the north coast, while volunteer troops to the number of 200,000 were soon recruited, drilled and equipped at several camps.

The first important engagement was at Manila Bay, where Commodore George Dewey, in command of the Asiatic squadron, completely annihilated the Spanish fleet. Troops were immediately sent to the Philippines under General Merritt, and an attack by the land and naval forces led to the fall of Manila on August 13. Meantime, a Spanish fleet under Admiral Cervera reached Cuban waters and took a position in the harbor of Santiago, on the southern coast of Cuba, where it was blockaded by an American fleet under Sampson and Schley. It was during this blockade that Lieutenant Hobson and a crew of volunteers attempted to bottle the entrance to the harbor by sinking the collier *Merrimac*.

Land Campaigns. In June, General Shafter, with a force of 17,000 men, landed at a point a little east of Santiago and invested the town. The enemy gradually retired within its fortifications in Santiago, offering the only important resistance at the hills of San Juan and El Caney, which were finally gained by the Americans under Major-General Shafter on July 2. On the following day Cervera, under orders from his government, attempted to break the blockade; but after a long running fight his whole squadron was beached or destroyed, and he, together with 1,700 men, was captured. The siege of the city was continued until July 15, when General Toral surrendered the whole District of Santiago.

Terms of Peace. On July 25 General Miles raised the United States flag over Porto Rico, and on the following day Spain made overtures for peace. August 12 a protocol was signed, and in December a final treaty of peace was accepted, by which Spain relinquished all claims to Cuba and surrendered Porto Rico, the Philippines and Guam to the United States, for a consideration of \$20,000,000 and special commercial privileges.

This war focussed attention upon several of its leaders. Commodores Schley and Sampson were each promoted to the rear-admiralty. Theodore Roosevelt, in command of the "Rough Riders," distinguished himself at San Juan, and on his return home was elected governor of New York.

The total expense of the war to the United States was \$165,000,000; 2,910 American soldiers lost their lives, of whom all but 306 died of disease. Because of this fearful death rate from causes other than battle, an investigation of the War Department was instigated, which, however, resulted in a general acquittal of the responsible officials.

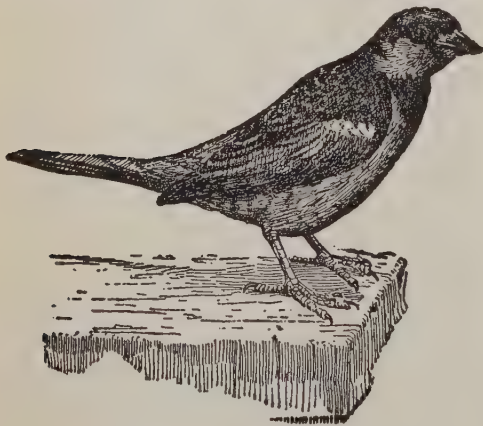
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Cuba	Roosevelt, Theodore
Dewey, George	Rough Riders
El Caney, Battle of	Sampson, William T.
Hobson, Richmond P.	Schley, Winfield S.
McKinley, William	United States
Manila Bay, Battle of	subhead History
Philippine Islands	Weyler, Nickolau V.
Porto Rico	Wood, Leonard

SPANISH INFLUENZA. See INFLUENZA.

SPANISH SUCCESSION, *suk sesh'un*, WAR OF THE. See SUCCESSION WARS.

SPARROW, the name of a large group of finches, which have, in general, a brown and gray plumage. The birds feed and nest on or near the ground, and are among the least



ENGLISH SPARROW

timid of wild birds. They chirp noisily, but comparatively few are songsters. The common *English house sparrow*, which is about six inches long, was brought to the United States and Canada about the year 1869 and has increased astonishingly in numbers, and now it is probably more numerous than any other wild bird. One pair will raise several families of four or five each year. These sparrows live chiefly in and about cities and towns.

It was once thought that sparrows were aids to the farmer, but it is now known that they eat few insects, but live chiefly upon grains and the refuse they gather near houses. They are notorious fighters among themselves,

and usually drive away the more desirable birds. Of the American species the most common is the *chipping sparrow*, a small grayish bird marked with a chestnut crown. The *field sparrow*, an eastern resident, and the *tree sparrow*, a winter visitor only, are similar species. The *sea-side* and the *sharp-tailed sparrows* inhabit the coast marshes.

There are in America several distinct species of musical sparrows. The *song sparrow*, a six-inch bird streaked on the breast with black or brown, has a remarkably clear, sweet refrain. The *vesper sparrow*, similarly marked, has a habit of singing in the late afternoon. One of the well-known sparrow songsters of the West is the *black-throated dickcissel*, while the large *fox sparrows* and *Harris sparrows* of the same regions are known to gather in flocks and sing in chorus. A beautiful little bird is the *white-throated sparrow* most familiar along the Canadian boundary, whose clear, cheery note is heard in the spring and about the summer nesting places.

SPARROW HAWK, a very small hawk, about ten inches long, which ranges from Northern Canada to Mexico. It is reddish-brown and black on the shoulders, and back and has grayish-blue wings. The nests are made in holes in trees. The eggs, numbering from five to seven, are cream-white marked with brown. The birds feed on insects, small rodents, reptiles and other enemies to the farmer, and thus render a distinct service to agriculture.

SPARTA, *spahr'ta*, or **LACEDAEMON**, *las ede'mon*, a celebrated city of ancient Greece, the capital of Laconia and the chief city of the Peloponnesus. It was a scattered city consisting of five separate sections. Unlike Athens, it was plainly built and had few notable buildings; consequently it left no imposing ruins.

The Spartans were a stern and rugged warrior race, despising danger and esteeming military glory the highest of honors. They were temperate in eating and drinking, and their food was of the plainest sort. By law they were debarred from trade and agriculture, and their chief occupation was military drill and physical exercise. The form of government was aristocratic, and the executive power was vested in two kings and five ephors. The Spartan child was trained to endure any hardships, to be self-controlled and obedient to authority. From the

age of seven to twenty he lived in a public institution and took his meals at the public table. From twenty to thirty he lived under arms in barracks, and although at thirty he was required by the law to marry, he still ate at the public table.

According to tradition, the Spartan state was founded by Lacedaemon, son of Zeus. The most celebrated of its legendary kings was Menelaus. It is believed the Spartans were the descendants of the Dorians, who invaded the Peloponnesus not later than 1000 B. C. Such of the former inhabitants of the state as did not emigrate were allowed to keep the poorest lands about the city and to work as tradesmen or mechanics, but they were given no part in the government. About 900 B. C., Lycurgus gave the country a code of laws under which it prospered.

About this time the Spartans entered on a period of conquest. They extended their sway over all the territory of Laconia, a part of the inhabitants of which they reduced to the condition of slaves. They also waged war with the Mycenaeans, the Arcadians and the Argives, against whom they were so successful that before the close of the sixth century B. C. they were recognized as the leading people in Greece. Early in the following century the Persian wars began, during which a rivalry grew up between Athens and Sparta. This rivalry led to the Peloponnesian War, in which Athens was humiliated, and the old ascendancy of Sparta was reestablished. Soon after this the Spartans became involved in a war with Persia by joining Cyrus the Younger in his rebellion against his brother Artaxerxes, and Athens, Thebes, Corinth and some of the Peloponnesian states seized the opportunity to declare war against Sparta. The final outcome of this struggle was the defeat of Sparta at Leuctra in 371 B. C.

During the following century Sparta steadily declined. Although determined attempts were made to restore its former greatness, these failed because there were less than a thousand inhabitants of true Spartan descent, and the majority of these were in a state of beggary. When Philip of Macedon entered Greece, Sparta struggled vigorously against him, but Macedonia was victorious in the end. With the rest of Greece, Sparta passed under the dominion of the Romans in 146 B. C. The old constitution of Lycurgus was reestablished under Roman rule, and the city pros-

pered until the fifth century, when it was sacked by the Goths.

Related Articles. Consult the following titles for additional information:

Athens	Helots	Peloponnesus
Dorians	Lycurgus	Philip II
Greece	Menelaus	Thermopylae

SPAR'TACANS, the name applied to a group of German radicals, who under the leadership of Dr. Karl Liebknecht and Rosa Luxemburg opposed the Social Democrats on the reorganization of the German government after the abdication of the Kaiser, Wilhelm II, in November, 1918. The Spartacans are extreme Socialists, and have for their purpose the development of a dictatorship of the common people. Dr. Liebknecht had issued a number of pamphlets opposing the war, under the pen name of *Spartacus*, and from this incident the party took its name.

The Spartacans adopted the methods of the Bolsheviki in Russia and attempted to inaugurate a reign of terror by starting a counter-revolution. They were, however, soon suppressed. Rosa Luxemburg was killed by a mob and Liebknecht was shot while attempting to escape from a guard that held him under arrest. While the loss of the leaders, together with the active measures taken by the government to suppress the Spartacans, stopped the counter-revolution, the party continued its propaganda. See GERMANY; LIEBKNECHT, KARL.

SPAR'TACUS, a Thracian gladiator, the instigator and leader of a revolt of the slaves in Italy, between 73 and 71 B. C. He had been compelled, like other barbarians, to serve in the Roman army, but he had deserted and become the head of a band of robbers. At length he was taken prisoner and placed in a gladiatorial school at Capua, with two hundred other slaves. They formed a conspiracy, effected their escape and were joined by the disaffected slaves and peasantry of the neighborhood, so that in a few months Spartacus found himself at the head of over sixty thousand men. Two consuls were sent with armies against him, but Spartacus defeated them in succession and led his forces toward Rome. In this crisis Crassus was placed at the head of the army and managed to hem in the revolted slaves near Rhegium. Spartacus broke through the enemy by night and retreated, but later he had to encounter the army of Crassus. His soldiers were overcome, and Spartacus himself fell fighting.

SPAR'TANBURG, S. C., the county seat of Spartanburg County, ninety-three miles northwest of Columbia, on the Charleston & Western Carolina, the Carolina, Clinchfield & Ohio of South Carolina, the Southern, and the Piedmont & Northern railroads. The city is on an elevation of over 800 feet. It is in a rich cotton-growing region, containing, also, deposits of limestone, granite, gold and iron. There are thirty-eight cotton mills with more than 800,000 spindles, ironworks, lumber mills, broom factories and soap works. Converse College and Wofford College are located here, also a state institution for the deaf, dumb and blind. The city has the commission form of government. Population, 1910, 17,517; 1920, 22,638, a gain of 29 per cent.

SPASM, *spaz'm*, an ailment of which the chief feature is jerking of the muscles. Spasm is a symptom of disease, not a specific disease. It occurs in epilepsy, in the final stages of Bright's disease, frequently in poisoning cases, and occasionally in attacks of indigestion. Children suffering from intestinal trouble sometimes have convulsions more terrifying than dangerous. The remedy for attacks of spasm depends upon the cause, and must be determined by a physician.

SPAVIN, a disease of horses, which affects the hock joint, the joint in the hind leg between the knee and the fetlock. Spavin may occur in two forms. The first, which is called *bog*, or *blood spavin*, arises from an injury and is accompanied by swelling and inflammation. In the other form, known as *bone spavin*, there is an injury which causes a bony substance to be deposited about the joint, in some cases causing permanent stiffness. A bone spavin grows very slowly, and it may not be noticed until the horse becomes lame. No cure has been found for it. The treatment for bog spavin consists in hot applications and blistering. When these fail, burning with a hot iron may be resorted to, but this should be done by a skilful veterinarian.

SPAWN, the eggs of fishes, frogs and reptiles. The number of eggs produced by fishes varies greatly in different species; for instance, in the spawn of a single codfish, as many as 3,500,000 eggs have been found. Fish eggs are an important article of food for sea animals, and hence millions are necessary to save a species from extinction.

As a measure of safety sea fish often ascend rivers in the spawning season; and some fresh-water fishes spawn in the ocean.

SPEAKER, *speek'er*, the title given to the presiding officer of a legislative body. It applies to that official in the English House of Commons, in the House of Representatives in the United States and in the Dominion Senate and House of Commons in Canada.

Until 1910 the Speaker of the United States House of Representatives was assumed to be the second most powerful man in the government of the nation, next to the President. This was due to his power to appoint committees of the House; it was possible by the use of this authority practically to control legislation. In the year named, however, the Speaker was deprived of this arbitrary power.

The Speaker of the House is chosen from among the membership of that body, for a term of two years, and he has a vote on all questions. By calling another member to his post he may descend to the floor and address the House on any subject. He receives an annual salary of \$12,000, equal to that of the Vice-President, who is presiding officer of the Senate.

In the state legislature the Speaker has powers and duties very similar to those of the Speaker of the United States House of Representatives.

In the English House of Commons this official is strictly non-partisan, and the office may be held permanently by the same person through several opposing administrations. He cannot take part in debate, neither can he vote on any question except in case of a tie. **SEE CONGRESS OF THE UNITED STATES; REPRESENTATIVES, HOUSE OF.**

SPEARMINT, *spee'mint*, a species of mint native to temperate regions of most parts of the world. Ninety per cent of the peppermint of the United States is produced in Saint Joseph County, Mich., the world's most important center of spearmint distillation. In this vicinity almost every evening the wind wafts breezes heavily laden with mint odors.

Spearmint yields an oil utilized in the preparation of perfumes and medicine and as flavoring in chewing gum, julep, candies, soups, sauces, etc. The smooth, erect stems of the plant grow to two feet in height and bear at the top whorls of pale purple or white flowers. **SEE MINT.**

SPECIE, *spe'she*, **PAYMENTS**, RESUMPTION OF, in American history, specifically, the steps taken by the United States between 1875 and 1879 for gradual redemption of United States notes, of which there were at that time \$382,000,000 out-standing, as a result of the issues of paper money during the Civil War. It had been found necessary in 1861 to suspend the redemption of these notes in metallic money, by reason of the extraordinary demand for gold caused by the war.

As the volume of paper money increased, its value naturally decreased, causing not only a rise of prices, but a general uncertainty in financial and commercial circles. In order to improve the situation, an act was passed in 1866 providing for the gradual retirement of greenbacks and the payment of them in specie, but this was not satisfactory. Another act was passed in 1875, providing for complete resumption of all notes presented on January 1, 1879, and for the gradual accumulation of gold in the treasury by means of the sale of bonds, for the purpose of redeeming these notes. As the supply of gold increased, the value of greenbacks or government notes proportionately rose, and when the government offered to redeem its notes in gold, few were presented.

SPECIES, *spe'shez*, a distinct kind of animals or plants. Any group of individuals having common characteristics and designated by a common name, although they may differ among themselves in minor details of form or color, is called a species. Such individuals reproduce their kind by indefinite interbreeding. A group of species with points in common is called a genus. See CLASSIFICATION.

SPECIFIC GRAVITY. See GRAVITY, SPECIFIC.

SPECTACLES, an optical device designed to aid the eyesight, the invention of Roger Bacon, an English scientist of the thirteenth century. The first spectacles were very crude, and it was not until the eighteenth century that they began to be made according to the principles of refraction of light. Spectacles consist of a pair of lenses made of clear rock crystal, ground according to a formula to meet the needs of the person for whom they are intended. Long-sighted persons require convex lenses; those who are short-sighted need lenses which are concave. When the eyes have difficulty in distinguishing objects both near and far, divided (bi-focal)

spectacles are worn. In these each lens consists of two semi-circles of glass, differently ground, fitted neatly together one above the other in the frame, or of a single piece of glass with the upper and the lower half ground to focus differently. The latter is very much more expensive. In cases of astigmatism, a structural defect of the eye, the lens used is the segment of a cylinder.

Spectacles can be made with such skill and in such variety that almost any defect in vision arising from irregularity in the shape of the eye can be corrected by them. One should never select spectacles without consulting a skilled oculist, since the eyes are seldom alike, and a lens that is suited to one eye is not suited to the other. Unless spectacles are adjusted to the eyes, they are liable to be injurious rather than beneficial.

The frame of spectacles is made of tortoise shell or of metal, usually gold or steel. It consists usually of a rim enclosing the glass, joined by a bridge which rests upon the nose, and side bars and bows, which fit over the ears. Glasses which are held by clips to the nose are rapidly supplanting those held by bows.

SPECTROSCOPE, *spek'tro skope*, an instrument for studying the spectra of bodies (see LIGHT, subhead *Spectrum*). The ordinary spectroscope has a central prism enclosed in a frame, shaped like an alarm-clock case and laid face upward on a standard. From the sides of this frame extend, horizontally, three large tubes, equidistant from one another. One of these tubes, called the *collimator*, has, at the end near the prism, a double-convex lens, and at the other end, at the focus of the lens, a small slit, formed by two pieces of adjustable metal which regulate the width of the slit and the amount of light admitted. The light entering the slit strikes the prism in parallel rays. One of the tubes contains a graduated scale, by means of which the spectrum is thrown on a screen, and the other is a telescope, by means of which the phenomena are observed.

The spectroscope is used for the purpose of determining the composition of the heavenly bodies, such as the sun and stars, and the composition of substances when adulteration is suspected. It is much used in astronomy. By means of it astronomers may determine distances in space and the directions and velocities of remote bodies. It has made possible some of the greatest of as-

tronomical discoveries. See SPECTRUM ANALYSIS.

SPECTRUM. See LIGHT.

SPECTRUM, spek'trum, ANALYSIS. By passing a beam of sunlight through a glass prism in a dark room an image containing all the colors of the rainbow is obtained. This image is called the *solar spectrum*, and is formed because the prism separates the beam of white light into the colors which unite to form it. Experiments with other substances show that they also produce spectra when burned in the spectroscope (which see), and *spectrum analysis* is the process by which the composition of substances is ascertained by the spectroscope. Burning bodies produce three kinds of spectra, known as the continuous spectrum, the bright-lined spectrum and the dark-lined, or absorption spectrum. For instance a *continuous* spectrum is formed by a glowing or burning body near the instrument or by the sun when its rays are analyzed by a single prism. If a candle or gas light is burned near a prism, it forms a continuous spectrum. A *bright-lined* spectrum is formed when gases which are not under great pressure are burned. The lines thus formed have a definite position in the spectrum and never change in the same substance. The *dark-lined* spectrum is formed by the absorption of light as it passes through the vapor of some substance between the burning body and the spectroscope. Experiment has shown that the vapor of any substance absorbs the rays of light which that substance produces in the spectrum when it is burned. These dark lines are known as *Fraunhofer* lines, from the name of their discoverer, and a number of them appear in the spectrum of the sun. Since these occupy a definite position on the screen, they are designated by the letters of the alphabet as *a, b, c*.

The process of spectrum analysis is as follows: The dark lines in the solar spectrum are produced by its light passing through the vapor of certain substances. Since, in the spectrum of iron, bright lines cover certain dark lines in the solar spectrum, therefore we infer that the atmosphere of the sun contains the vapor of iron. The presence of other substances in the sun has been discovered in a similar manner. In testing the composition of any substance by means of the spectroscope, a small quantity of the substance is burned and its spectrum is noted. In case the substance contains impurities, the

lines which these impurities form will also appear on the screen, and their presence is thus noted. The great value of the spectroscope for ascertaining the purity of substances is in its ability to detect minute quantities. It is estimated that as small a quantity as $\frac{1}{350,000}$ of a grain of lithium can thus be detected.

SPEECH, in the broadest sense, is the art of using language to convey thought. In a more restricted sense speech may be designated as the act of expressing ideas by means of vocal sound. According to the latter definition, "Polly wants a cracker," which is merely a repetition of a succession of orderly sounds without understanding of their meaning, could not be called speech; neither could the utterances of delirious persons and maniacs, and yet these latter are more than *voice*, which is merely the act of producing any sound by means of the vocal organs. Speech is to be distinguished from *language*, which is merely a system or code used in common by a group of individuals for intercommunication.

SPEEDOMETER, a device for recording the speed at which a vehicle is moving and also the distance traveled. It is also known as a *cyclometer*. The speedometer is in general use on automobiles, and is frequently attached to bicycles. The speedometer for automobiles consists of a system of clockwork connected with the fore wheel of the automobile, so adjusted that one dial records the distance traveled, and the other indicates the speed in miles per hour. The device used on bicycles records the distance traveled. It is of simpler construction and is set in motion by a cam on the spoke of the fore wheel.

SPELLING, spel'ing. Quite as important as correct articulation of the sounds that form a word and the proper placing of the accent, is accurate spelling of the word. The ability to spell correctly is cultivated largely by means of careful observation in one's reading and by persistent efforts to be exact in spelling words both orally and in writing. Especially is this true of those who use English, since our language is usually lacking in uniformity in the matter of spelling. However, there are several rules for spelling that are so generally appreciable as to be of much value to those who do not readily retain in memory the exact form of words. Among these rules the following are most important:

Rules of Spelling. Words ending in *ie* usually drop the *e* and change *i* to *y* in adding the suffix *ing*; as, lie, lying.

Words ending in *y*, preceded by a consonant, change *y* to *i* when a suffix beginning with a consonant is added; as, bounty, bountiful.

Words ending in *y*, preceded by a vowel, retain the *y* in adding a suffix; as, joy, joyous.

Monosyllables and words accented on the last syllable, ending in a single consonant, preceded by a single vowel, double the final consonant before a suffix beginning with a vowel; as, hit, hitting; begin, beginning.

Words ending in silent *e* drop this final *e* when a suffix beginning with a vowel is added; as, residue, residuum.

Words ending in *e* usually retain this final letter when adding a suffix beginning with a consonant; as, resolute, resoluteness.

When a syllable is added to a word ending in a double consonant, this consonant is usually retained; as, still, stillness.

Nouns regularly form their plurals by adding *s*; as, table, tables.

However, when the singular noun ends with a sound that does not unite with *s*, *es* is added; as, church, churches.

Nouns ending in *y* preceded by a vowel form their plurals by adding *s*; as, monkey, monkeys.

When final *y* is preceded by a consonant, *y* is changed to *i* and *es* is added in forming the plural; as, city, cities.

Some nouns ending in *f* or *fe* change the *f* or *fe* to *v* and add *es* to form the plural; as, shelf, shelves.

Nouns ending in *o*, preceded by a consonant, sometimes form the plural by adding *s* but more frequently by adding *es*; as, solo, solos; motto, mottoes; potato, potatoes.

Root Words and Derivatives. Interesting recitations in the formation of derivatives from root words may prove of much assistance in teaching children to analyze the building up of words when they find difficulty in spelling them. A root word may be chosen and as many derivatives as possible formed from it by adding prefixes and suffixes. The same lesson may prove doubly profitable by defining the root word and showing the changes in significance after the addition of the prefixes or suffixes. The following is offered as a suggestive exercise.

Tract—Draw

Tract-oror=that which.
Tract-ionion=act of.
Tract-ileile=may be.
Tract-ableable=able to be.

Abs-tractabs=away from.
At-tractat=near to.
Con-tractcon=together.
De-tractde=away from.
Ex-tractex=out of.
Pro-tractpro=out.
Re-tractre=back.
Sub-tractsub=from under.
Attract-iveive=tending to.
In-tract-ablein=not..able=
able to be.

Explanation. A tractor is an instrument which draws.

Traction is the state of being drawn or the act of drawing, as the traction of a muscle.

Gold is a tractile metal, as it may be drawn out in thin strips.

A tractable person is one easily drawn to a proper course of conduct.

An abstract manner results when the mind is drawn away from surrounding objects.

To attract people we must have power to draw them to us.

To detract from value is to lessen or draw away from it.

An extract from a book is a part which is drawn out of it.

A protracted meeting is one which is drawn out or extended beyond the usual time.

When a statement is retracted it is withdrawn—"taken back."

When a number is drawn from under or taken away from another we subtract it.

That which tends to draw one to it is attractive.

An intractable student is one who is not easily drawn to discipline.

Spelling Reform. It is generally agreed that English spelling is complicated and illogical. Considerable progress has been made in the direction of simplification, though the radical changes proposed by some advocates of spelling reform have not been adopted generally. The radicals, for example, would write *dout* for *doubt*, *hed* for *head*, *nat* for *gnat*, and *fantom* for *phantom*. In the United States many educators have adopted the recommendations of the National Education Association, which uses the following forms:

altho	demagog	program	thorofare
catalog	pedagog	tho	thru
decalog	prolog	thoro	thruout

The general tendency is toward dropping superfluous letters, but it will require a long time to eliminate such letters completely.

SPENCER, HERBERT (1820-1903), distinguished English philosopher. Because of delicate health during childhood and youth, he was educated at home and lived most of the time out of doors. In this way he ac-

quired a dislike for schools, and so completed his education under tutors. During this time he was much interested in making collections of insects and in rearing moths and butterflies and in studying the botany of the locality.



HERBERT SPENCER

At the age of seventeen, Spencer became an engineer on the London & Birmingham Railway and remained at that occupation ten years. After this he was for four years sub-editor of the *Economist*; and it was in the course of this latter period that he made the acquaintance of George Eliot, John Stuart Mill and other celebrated scholars and thinkers and published his *Social Statics*. Spencer conceived the idea of publishing a philosophy whose scope should include all existing knowledge, and upon this he faithfully labored throughout his life and was finally able to see it completed and published.

Spencer was remarkably well fitted by nature for the task which he had set himself. He was a patient observer and had acquired a vast store of facts in all sciences and possessed the power of seeing relations between facts to a remarkable degree—to a much greater degree than Darwin or other specialists. Whatever opposition may in the future be given his “principles,” intelligent men will always look with the greatest respect upon his effort to systematize knowledge and will give to him the credit accorded to no other man who has engaged in a similar labor.

Like Darwin, Spencer was a thorough believer in evolution and did much through his lectures and writings to establish and extend the theory (see *EVOLUTION*). He believed in the unity of all things, and he set forth this belief in so convincing a manner that his popularity grew in spite of the violent opposition which some of his statements caused. His works have been particularly well received in the United States. Among those best known are *First Principles*, *Principles of Biology*, *Principles of Psychology*, *Principles of Sociology*, *Principles of Ethics* and *Education*. Besides these, he wrote

numerous books on various subjects and three volumes of *Essays, Scientific, Political and Speculative*.

SPENCER GULF, an inlet of the Southern Pacific Ocean, on the southern coast of Australia, extending inward two hundred miles. Its greatest breadth is about ninety miles. At the upper end it narrows to a width of three miles, and at its head is Fort Augusta. At the lower end it again narrows between Eyre Peninsula, on the west, and York Peninsula, on the east.

SPENSER, EDMUND (1552-1599), one of the foremost English poets of the Elizabethan Age, was born at East Smithfield, London. In 1576 he received from the University of Cambridge the degree of M. A., and shortly afterwards became a member of the household of the Earl of Leicester. He was introduced at court by Sir Philip Sidney, to whom he dedicated his *Shepherd's Calendar*, published in 1579.



EDMUND SPENSER

In 1580 he went to Ireland, as secretary to Lord Grey, deputy of the island, and had a part in restoring peace after Desmond's rebellion. A large part of Desmond's forfeited estate was given him by the government, and on it he lived after 1586.

Here he worked on the *Faerie Queene*, the first three books of which were published in 1590, with a dedication to Queen Elizabeth. He then passed two or three years in Ireland, where, in 1594, he married. His courtship is celebrated in eighty-eight sonnets, and his marriage in *Epithalamium*, the finest wedding song in the English language. After another visit to London, in the course of which he published three more books of the *Faerie Queene* and his *Four Hymnes*, Spenser returned to Ireland, and in September, 1598, he was appointed sheriff of the County of Cork. The rebellion of Tyrone, however, took place in October; Spenser's house was fired by the populace, and, according to some accounts, his child perished in the flames. The poet arrived in England with body and spirit broken by these misfortunes, and he died in the following January. He was interred in Westminster Abbey, near Chaucer. As a poet, although his minor works contain many beau-

ties, Spenser will be judged chiefly by the poetical allegory, the *Faerie Queene*. It was the poet's intention that this work should embrace twelve books, each setting forth a cardinal virtue embodied in a knight. Only six were written, besides two cantos of *Mutabilitie*. It is supposed that part of the unfinished poem may have perished when the poet's house was sacked and burned. Because of his great influence on his successors Spenser has been called "the poet's poet."

SPERMACETI, *spur ma sé'te*, a substance resembling wax, found in the cavities of the head and in the blubber of the sperm whale. It is used in making candles, ointments and face creams. In the living animal this material occurs in combination with a thick oil; on exposure to air the spermaceti separates from the oil in white flakes. When purified, this substance becomes a semi-transparent solid, in appearance resembling tallow. Some of the larger whales have yielded twenty-four barrels of spermaceti. See **SPERM WHALE**.

SPERMATOPHYTES, *spurm'a toh fites*. See PHANEROGAMOUS PLANTS.

SPERM OIL, the oil of the sperm whale, which is separated from the spermaceti and the blubber. This kind of oil is much purer than train oil and burns away without leaving any charcoal on the wicks of lamps. In composition it differs but slightly from common whale oil.

SPERM WHALE, or **CACHALOT**, *kash' a lot*, a species of whale belonging to the section of the whale order denominated *toothed* whales. The sperm whale is generally met with in the Pacific, but occasionally it is also found on the coast of Greenland. The large blunt head in an old male is sometimes thirty feet long, about a third of the total length of the body. *Blow holes*, or S-shaped nostrils, are situated in the front part of the head. The weight of an adult animal is estimated to be about 200 tons. This whale is valuable for its oil and for a substance from the head, known as *spermaceti*. See **SPERMACETI**; **WHALE**.

SPHERE, *sfeer*, a geometric solid bounded by a surface every part of which is equally distant from a point called the center. It may be conceived to be generated by the revolution of a semicircle about its diameter, which remains fixed and which is called the *axis* of the sphere. A section of a sphere made by a plane passing through its center is called a *great circle* of the sphere; and

when the cutting plane does not pass through the center the section is called a *small circle* of the sphere. The surface of a sphere is equal four times the area of its great circle.

SPHEROID, a body or figure resembling a sphere, but not perfectly spherical. In geometry it is a solid generated by the revolution of an ellipse about one of its axes. When the generating ellipse revolves about its longer or major axis, the spheroid is *oblong*, or *prolate*; that is, it has protruding poles; when it revolves about its minor axis, the spheroid is *oblate*, that is, has flattened poles. The earth is an oblate spheroid with polar diameter shorter than the equatorial.

SPHINX, *sfinx*, a fabulous monster which figures in Greek and in Egyptian mythology. The Greek sphinx had a lion's body and paws, the head of a woman, the tail of a serpent and wings of a bird. The monster was said to live on a cliff overlooking the road to Thebes. To every one who passed she put a riddle, and devoured all who could not answer. Oedipus, when asked the riddle, "What animal is it that walks on four legs in the morning, two at noon and three in the evening," replied: "Man, for he walks on his hands and feet when young, erect on two feet in middle life and with the help of a stick in old age." Infuriated that her riddle was correctly answered, the sphinx hurled herself from the cliff and was killed.

The Egyptian sphinx had a lion's body, feet, legs and tail and the head of a man. It was always represented in a recumbent posture, with forepaws stretched forward. The sphinxes often stood in pairs guarding the entrances to temples. The largest sphinx, that near the group of pyramids at Gizeh, is about 150 feet long and sixty-three feet high; the body is hewn out of stone, but the paws, which are thrown out fifty feet in front, are constructed of masonry. The face, fourteen feet wide, has been badly mutilated, but notwithstanding this the figure is one of the most impressive monuments of Egypt. See **PYRAMID**.

SPHINX MOTH, a species of hawk moth, deriving its popular name from a supposed resemblance which its caterpillars present to the Egyptian sphinx, when they raise the fore part of their bodies. See **HAWK MOTH**.

SPHYGMOGRAPH, *sfig'mo graf*, an instrument for measuring the force and fre-

quency of the pulse. A strip of paper moved by clockwork passes under a pencil which moves from side to side describing an irregular wavy line on the sheet. The exact effect of certain external stimuli and of medicines is indicated by this delicate little instrument.

SPICE, the name given to a group of vegetable seasonings, including pepper, mace, nutmeg, cloves, ginger, allspice, cinnamon, capsicum and mustard. Some are produced from seeds, as mustard; some from bark, as cinnamon; some from root, as ginger; and some from fruit, as nutmeg. Spices contain a very small percentage of nourishment; they are valuable for food only because of their stimulating effect on the digestive organs. Employed in moderation they are wholesome, but are injurious if used in excess.

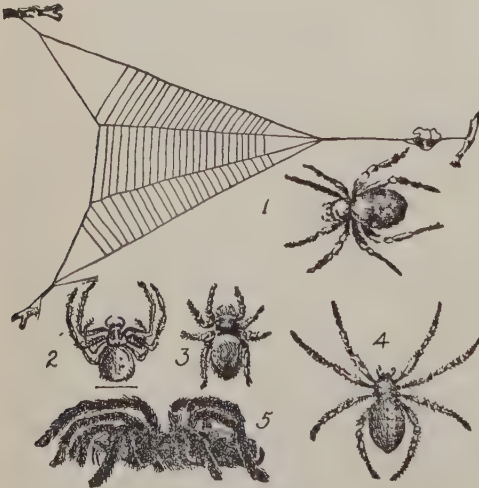
Related Articles. Consult the following titles for additional information:

Allspice	Cassia	Mustard
Anise	Cinnamon	Nutmeg
Caper	Cloves	Paprika
Caraway	Ginger	Pepper

SPICE ISLANDS. See **MOLUCCAS**.

SPIDERS, the common name of animals often classed with the insects, but really constituting a class by themselves, the Arachnida.

Characteristics. The spider's head and chest are united to form one segment; no



SPIDERS

1. Triangle spider and web.
2. Crab spider.
3. Jumping spider.
4. Large o. b. weaving spider.
5. Tarantula.

wings are developed, and the abdomen is furnished with from four to six cylindrical or conical glands or spinnerets, from the minute openings in which extremely fine, silky

filaments are drawn. With these filmy threads the spider makes its web, which is intended to entangle prey or to serve as a house for the industrious little animal. Spiders have four pairs of legs and no antennae. Most of them have eight eyes, borne on the front of the head. Their mandibles are terminated by a little hook, near which is a gland secreting a poisonous fluid by which the spider kills its prey. The female spider is much the larger, and the males rarely approach for fear of being devoured. The eggs are numerous and are usually hidden in cocoons, which are carried by some mothers until the eggs hatch. Often the countless young live upon the mother's back in such masses that they make her appear very much larger than she is.

Habits. Spiders are exceedingly interesting animals, and many species have developed remarkably intelligent ways of living. The tropical species are very large and powerful, some being able to capture small birds. The common garden spiders spin perfect geometric webs. When a fly is entangled in one of these, the spider darts out, throws another web about the intruder, kills it, sucks its blood, throws away the body and repairs the web in a very short time. Some species run with great speed; others leap many times their own length, to seize their prey. They are quarrelsome and often fight to the death. If their limbs are torn off; others may grow again. The water spiders inhabit fresh-water pools, where they live in skillfully constructed nests, looking like small diving bells, suspended mouth downward into the water.

Related Articles. Consult the following titles for additional information:

Antennae	Tarantula
Arachnida	Trapdoor Spider
Spider Web	

SPIDER WEB. To spin its web, the spider raises its spinnerets in the air, and the gentle pressing of them against an object causes the exudation of what may be described as liquid silk. Upon contact with the air, the threads harden and unite into one strand. This thread becomes a sort of suspension bridge which the spider tightens with its claws and cements firmly to a beam, leaf or wall. On several of these strands a gossamer net is spun.

The web of the common house spider consists of numerous criss-cross strands interwoven around the supporting spokes and forming an irregular wall around a central

space. The spider repairs with great alacrity any broken portion of its web. However, after it has spun several webs, it exhausts for a time its supply of silky fluid and often adopts predatory methods in taking possession of some other spider.

The orb web of the large black and yellow garden spider is the most delicate and skillfully constructed. It is geometric and consists of fine spiral strands fastened to spokes, similar to those of a wheel, and affixed to a branch or leaf with threads. That insects hitting against it may be trapped, the net is hung vertically. As the spider is enabled to run on the radiating strands of its web, it is never enmeshed; and the insect is held captive by minute, pearl-like drops of the glutinous substance.

Young spiders spin the single shining threads often seen suspended between grass stalks. Threads of silk cast off into the air by these spiders often float away with the breeze, and, spinning more threads as they go, they are blown to new areas. Thus the *flying*, or *ballooning spiders*, sail through the air and distribute themselves over the globe. The spider does most of its spinning at night or in the early hours of the morning.

SPIKENARD, or **NARD**, a perfume obtained from a plant of the valerian order, native to the East Indies. The plant has a fibrous root stock or spike, from which grow several thick stems about two inches long. These highly aromatic stems are the source of the perfume. This is the true spikenard of the ancients, used by the Romans in their baths and by Eastern peoples. It is still highly prized in the Orient, where it has been used for centuries to perfume ointments. The spikenard mentioned in the Bible was probably an unguent perfumed with this odor. It was worth approximately fifty dollars a pound.



SPIKENARD

In the southern part of Canada and the northern sections of the United States there is a similar plant with large aromatic roots which are used in making a tonic. This plant is called *American spikenard*, or *Indian root*.

SPINACH, *spin'ayj*, or *spin'ach* (the first preferred) is a garden vegetable, cultivated for its leaves, which are used for greens and in making soup. There are two varieties, the prickly spinach and the smooth spinach. The latter is the variety more generally used. It has round, blunt leaves and a smooth fruit. For early spring use, the seed is sown in the fall, usually in drills about a foot apart. In the spring the plants grow rapidly and are ready for market in a few weeks. Spinach needs a fertile soil, for if it grows slowly the leaves are tough and bitter. The food value is slight, but it has a slightly tonic effect, and its delightful flavor makes it a desirable article of food. The plant is supposed to be a native of Asia, and it was first cultivated in Arabia.

SPINAL CORD, the nervous cord which extends from the brain along the back side of the spinal column, and from which all the important nerves and systems of nerves branch. At the center of the cord is a tiny canal, which is connected directly with the cavities of the brain. Next to it is the gray matter, and around this is the so-called white matter, which is composed only of nerve fibers. See **BRAIN**; **NERVOUS SYSTEM**.

SPINNING, the making of thread or yarn by twisting the fiber of wool, flax, cotton, silk or other material, has developed into a great modern industry from a humble household occupation.

The Evolution of the Spinning Wheel. In earliest times spinning was accomplished by the use of the distaff and the hand spindle. The fiber, when spun, was wound upon the distaff, and the spindle, consisting of a round stick tapering at each end, with a notch for fixing yarn or thread at the upper end, was held in the hand and rotated by a movement against the right leg, while the left hand of the spinner gathered and supplied the fiber. The first improvement upon this device was the fixing of the spindle horizontally in a frame, causing it to rotate rapidly by means of a band that passed around a large wheel. This was the beginning of the spinning wheel, which is supposed to have been invented sometime in the sixteenth century (see **SPINNING WHEEL**). The treadle was added later, thus giving the spinner both hands with which to manipulate the thread.

The first spinning wheels contained only one spindle, but those with two spindles were

afterwards invented. The next great invention in spinning consisted of the spinning jenny, invented by Hargreaves (see SPINNING JENNY). This made possible the spinning of a large number of threads at once. Later Hargreaves's invention was improved upon by the invention of the water frame, which made an evenner and finer yarn. The mule-jenny, which is the basis of all spinning machines now in use, consists of a combination of the spinning jenny and the water frame. By means of these inventions the art of spinning was very materially advanced, and one operator could produce as much yarn in a day as fifty or more working by the old method.

Modern Methods. The size of the yarn and the forms of the twist are determined by the speed with which the machine operates and the rapidity with which the thread is drawn out, rapid motions producing a fine, hard-twisted yarn, while slow motions produce a coarse and more loosely twisted product. While it is possible to regulate spinning machines, so as to have them yield yarn of different grades, in large manufactories it is found more economical to construct each machine for the manufacture of a particular grade and to devote it entirely to that purpose. This makes feasible the construction of simpler machines, and the work can be accomplished more rapidly. See CLOTH; WEAVING.

SPINNING JENNY, the name given to the first spinning machine by means of which a number of threads could be spun at once. It was invented about 1767 by James Hargreaves, a Lancashire weaver, and consisted of a number of spindles turned by a common wheel or cylinder worked by hand. Later it was replaced by the mule-jenny. See SPINNING.

SPINNING WHEEL. A machine for spinning wool, cotton or flax into threads by hand. It consists of a wheel, a band and spindle. The wheel for spinning flax has a distaff attached and is driven by the foot; but the wheel for spinning wool is driven by hand. The spinner turns the wheel with the right hand, and holds the wool, which is in the form of rolls about three feet long and a half-inch in diameter, in the left hand. The degree of fineness of the yarn is determined by the rapidity with which the thread is drawn out by a backward movement of the spinner.

SPINOZA, *spe no' zah*, BARUCH BENEDICT (1632-1677), a Dutch-Jewish philosopher, born at Amsterdam, whither his parents had fled from Catholic persecution in Portugal. He was carefully trained in Jewish theology, but after reading Descartes and Bruno he turned from the Jewish faith. Expelled from the Israelitish community, he fled from Amsterdam to the suburbs to escape the enmity of the fanatical Jews, and after five years' seclusion he removed to Rhynsburg. Finally he settled in The Hague, where he died. By his skill as a grinder of optical lenses, he managed to earn a living. He refused a pension from the French king and a professorship in Heidelberg, because their acceptance might interfere with his freedom of thought and conduct, but he accepted a legacy from his friend De Vries. This annuity enabled him to devote a large part of his time to the study of philosophy.

In 1670 he published anonymously *Tractatus theologico-politicus*, a practical political treatise, designed to demonstrate the necessity, in a free commonwealth, of freedom of thought and speech. This work called forth such a storm of adverse criticism that Spinoza published nothing further. After his death all his unpublished writings were published. *Ethics Demonstrated in the Geometrical Order*, which he had completed in 1674, is his most famous work and the one containing his metaphysical system. The essence of this system is that God is identical with the universe.

SPIRAEA, *spi re'ah*, a class of herbs and shrubs of the rose family, found in the north temperate zone. There are about sixty species, adapted to a wide range of soil and conditions. Well-known varieties are *dropwort*, *meadow-sweet*, *hardhack*, *saxifrage* and *shadbush*. The flowers grow in clusters of various forms and may be white or pink.



SPINNING WHEEL IN
THE HOME OF
GOVERNOR CARVER

Several species are among the showiest of American shrubs. The steeplebush, with its spirelike clusters of tiny white flowers; the Douglas spirea, with whitened leaves; the bridal wreath, with its dainty, graceful, downward curving stems covered with little leaves and bearing profusely drooping clusters of tiny feathery white flowers—these are favorites. They are much used in landscape gardening, especially in city parks.

SPIRE, the tapering part of a steeple, which rises above the tower. It had its beginnings in the pyramidal or conical roofs on eleventh-century buildings in the Romanesque style, specimens of which still exist. These roofs, becoming gradually elongated and more and more acute, resulted at length in the elegant, tapering spire. The spires of medieval architecture, to which alone the term is appropriate, are generally square, octagonal or circular in plan; they are sometimes solid, more frequently hollow, and are variously ornamented with bands, with panels, more or less enriched, and with spire lights.

SPIRITUALISM, the belief that communication can be held with disembodied spirits. It is of ancient origin, but in its limited and modern form, it dates from the year 1848. In that year a Mr. and Mrs. Fox, who lived with their two daughters at Hydeville, N. Y., were disturbed by repeated and inexplicable rappings throughout the house. At length, according to the history of this belief, one of the daughters reported that the raps were intelligible; that the unseen "rapper" was the spirit of a murdered peddler. When this phenomenon was made known, a belief that intercourse could be obtained with the spirit world became general, and numerous "spirit circles" were formed in various parts of America. The manifestations thus said to be obtained from the spirits were rappings, table turnings, musical sounds, writings and the unseen raising of heavy bodies.

The peculiarity of these phenomena was that they were always more or less associated with a *medium*, that is, one who was supposed to have an organization sensitively fitted to communicate with the spirit world. Daniel D. Home possessed unusual powers and was said to be able to float up to the ceiling or out of the window into the next room. Such claims not only attracted the curious and converted the unthinking, but also received the attention of legal and scientific men.

Judge Edmonds and Professor Hare undertook to expose fraud in connection with the manifestations, but both had to admit the genuineness of a slight part of the evidence; while in England, such scientists as A. R. Wallace, Sir William Crookes and Professor DeMorgan professed belief in the genuineness of the phenomena. The believers in spiritualism are most numerous in England, where investigations are made by the Society for Psychical Research and the results annually published in a volume of Proceedings. In the United States, the Spiritualists number about 250,000. Spiritualism has been greatly discredited owing to the fact that many impostors purporting to have mediumistic powers have carried on "confidence games" at the expense of the public.

The best recent books on spiritualism are *Human Personality and Its Survival of Bodily Death*, by F. W. H. Myers; *The New Revelation*, by Sir Arthur Conan Doyle; *Spiritualism; Its History, Phenomena and Doctrine*, by J. Arthur Hill; *Raymond*, by Sir Oliver Lodge; and *Psychical Phenomena and the War*, by Hereward Carrington.

SPIROMETER, a contrivance for determining the capacity of the human lungs; that is, for measuring the amount of air which can be expelled after a deep breath is taken. The instrument most commonly employed consists of two cylinders, one inverted and of a size that will allow it to move freely up and down with the other. The lower cylinder is filled with water, and to the top of the upper a tube and an air cock are attached. When air from the lungs is blown into the tube, this cylinder rises. A graduated scale marks the number of inches which the cylinder rises, and the diameter being known, the number of cubic inches of air expelled from the lungs is easily determined.

SPITHEAD, *spit'hed*, a roadstead off the southern coast of England, between Portsmouth and the Isle of Wight. It is fourteen miles long and four miles wide, and is a favorite anchorage of the British navy, being well sheltered from winds and protected by fortifications. The "spit," from which it takes its name, is a sandbank three miles long jutting southward from the Hampshire shore.

SPITZ, or **POMERANIAN DOG**, a small dog about the size of a spaniel, with erect ears, a foxlike face, sharp, pointed muzzle and a bushy tail, usually carried over the back. Its coat is soft and silky and may be

black, gray, red-brown or pure white. In its native province of Pomerania in Prussia, the Spitz is trained to tend sheep. In America the white variety with black-tipped nose is valued as a pet.

SPITZBERGEN, *spits burg'en*, a group of islands in the Arctic Ocean, situated about 400 miles north of Norway, between Franz Josef Land and Greenland. The largest islands are West Spitzbergen, Northeast Land, Edge Island, King Charles Land, King Charles Foreland and Hope Island. The highest elevations reach an altitude of 5,000 feet. The islands are icebound during the greater part of the year and are remarkable for the extensive glaciers found upon them. Recently they have become somewhat important as affording a starting point for numerous polar expeditions (see NORTH POLAR EXPLORATION). The sovereignty of the archipelago has never been decided, but valuable coal deposits have of late been exploited by English, American and Scandinavian companies.

SPLEEN, the largest of the ductless glands, in size about five inches in length and three or four in width, located in the upper part of the abdomen at the left of the stomach and between it and the diaphragm. It is oval in shape, of a bluish red color, is soft and spongy in composition, and easily crumbled. The functions of the spleen are obscure. It probably stimulates digestion through its secretions, stores up nutriment and aids in the production of blood corpuscles, especially those that combat certain diseases, as typhoid.

SPLICING, *splise'ing*, the process of joining two ropes without the use of a knot. The three chief varieties of splice are the *short splice*, the *long splice* and the *eye splice*. In making the *short splice* (Fig. 2) the ends of two ropes are unlaied for a short distance and are then fitted closely together; by the help of a marlinspike, the ends of each are laced over and under the strands of the other. The *long splice* is made in the same manner, but the rope is unlaied

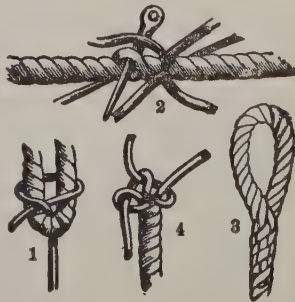
for a greater distance; hence the splice is stronger. The *eye splice* (Fig. 3) is made by bending over the end of the rope and lacing the strands into the rope where it is unlaied. The eye may be oval or circular. The *becket hitch* (Fig. 1) is the easiest method of attaching a small line to a rope. The *single wall* (Fig. 4) is the simplest method of preventing the end of a rope from fraying.

SPOFFORD, AINSWORTH RAND (1825-1908), an American librarian, born in Gilmanton, N. H. He received a classical education and became associate editor of the Cincinnati *Daily Commercial*. In 1861 he was appointed first assistant librarian in the Library of Congress; in 1864 he became librarian in chief, and held the position until 1899. As a librarian Spofford became widely known for his comprehensive knowledge of books and their contents. He wrote largely for the periodical press and edited, with others, *Library of Choice Literature*, *Library of Wit and Humor*, *A Practical Manual of Parliamentary Rules* and *American Almanack and Treasury of Facts, Statistical, Financial and Political*. During his administration the national library increased from 70,000 to more than 600,000 volumes.

SPOKANE, *spo kan'*, WASHINGTON, the county seat of Spokane County and the second largest city of the state, is situated on the Spokane River, 314 miles east of Seattle and 309 miles northwest of Butte, Mont. It is served by the Northern Pacific, the Great Northern, the Chicago, Milwaukee & Saint Paul, the Oregon-Washington Railroad and Navigation Company, a branch of the Canadian Pacific, and several lesser roads.

The city covers a tract of a little over twenty square miles and is beautifully situated on both sides of the river, which here flows through a gorge and forms a series of cascades, which are capable of developing large water power, as well as affording beautiful scenery. The streets are broad and regular and cross each other at right angles, and are well paved throughout the city. The city has an excellent system of street railways, which connect all parts with the business center.

Buildings and Parks. Among the important buildings are a Federal building, a city hall, courthouse, an auditorium, the old National Bank, the Paulsen building,



the Davenport Hotel, a Masonic Temple, the Spokane and Athletic clubs buildings, the high schools and the churches, among which the Roman Catholic and Protestant Episcopal cathedrals are especially worthy of mention. The city has forty-three parks and twelve playgrounds, whose combined area equals 1,939 acres. These parks contribute much to the beauty of the city. Fort George Wright, a military post within the city limits, occupies a site of over 1,000 acres.

Education. The city maintains an excellent system of public schools, and in addition to these the following educational institutions are of importance: Gonzaga College and the Academy of the Holy Name, both Roman Catholic, Saint Joseph's and the Lyons School for boys. Of all these institutions Gonzaga College is the most important. There are also a number of business colleges, and the city has a Carnegie Library of over 65,000 volumes, with seven branches, besides the libraries connected with the various schools.

Industries. Spokane is an important distributing center for a wide range of country, including eastern Washington, northern Idaho and northeastern Oregon. Within this territory are many important mines, as well as large areas of rich agricultural lands. These conditions give the city a large trade. The Spokane River affords abundant water power. Within a distance of sixty-five miles, seven hydro-electric plants generate over 182,000 horse power, some of which is used in the city and some carried to the Coeur d'Alène mines, 100 miles distant. The leading manufactures include paper and wood pulps; bakery products; brick, lime and sewer pipe; lumber and lumber products, and flour and grist mill products. There are also many smaller manufactures.

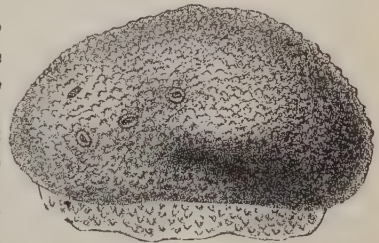
History. The first settlement was made in 1873, and was named Spokane Falls. The town grew slowly until the opening of the Northern Pacific Railroad in 1881; it was then incorporated as a city. In 1889 a fire nearly destroyed the business center, but it was soon rebuilt on a more permanent plan. Like many other western towns, the city also suffered from overdevelopment, but when these crises were past, Spokane entered upon an era of steady and continuous prosperity. The commission form of government was adopted in 1910. Popula-

tion, 1910, 104,000; in 1920, 104,204, showing only a slight growth.

SPONGE, *spunj*, a jellylike sea animal, belonging to the order Coelenterata. There are numerous species (see COELENTERATA), but what is known as the sponge of commerce is the skeleton of the animal.

Construction. When examined, a common sponge is found to contain numerous tubes extending into it in all directions. The smaller tubes unite to form larger ones; and if the sponge is cut open, it is found that these

all join together into one or more large tubes that radiate through the body from side to side.



SPONGE

In the living sponge these tubes are lined with the flesh of the animal. The cavities in the small tubes contain many digestive tracts, or stomachs, where the food is assimilated.

In the network of the fibers forming the sponge proper are found many spicules of silica and lime. In some these spicules of silica are so numerous as to give to the sponges a glasslike appearance, and when arranged in rows, like stars, they are very beautiful; such are the *glass-rope* sponge and *Venus's flower basket*. Sponges reproduce by means of eggs, formed by the layer of tissue which secretes the skeleton.

The Sponge of Commerce. The best sponges are obtained from the Mediterranean and Red seas, where they live in deep, clear water, from 150 to 200 feet below the surface. The methods of securing them vary in different localities. The old method of diving is to have two men go out in a boat, one of whom attaches a weight to his feet and descends to the bottom of the sea, where by rapid movements he gathers a few sponges and places them in a basket. He then gives a signal to the man in the boat, who hauls him up. By more recent methods, a diving dress is used, which enables the collector to remain under water a long time. Where the water is not too deep, the sponges are secured by spears or prongs, attached to long handles. The fisher uses a bucket with a glass bottom, which, when placed on the

surface of the water, enables him to see to a depth of sixty or more feet. When a sponge is discovered, he breaks it off with his prong and brings it to the boat. The sponges are either buried in warm sand or allowed to lie in the sun, until the flesh has thoroughly decomposed. They are then cleaned and beaten to expel all extraneous matter and are then dried and marketed.

Florida Sponge Industry. Nearly all of the sponges used in the United States come from Florida and the Bahama islands. The Florida fisheries have an annual output of about 623,000 pounds, approximating about \$545,000 in value. The best grades of Florida sponges, known as *sheep's wool*, are worth from two to five dollars a pound; the *yellow sponge*, from fifty to sixty cents, and the *coarse grass sponge*, from fifteen to twenty-five cents per pound. As many of the richest sponge beds are nearly exhausted, the United States government has passed laws to protect the Florida sponge fisheries against abusive fishing methods. Scientists are experimenting with artificial production because of the imminent shortage.

The World War greatly stimulated the Florida sponge industry on the Gulf coast, because of the difficulty of obtaining the Mediterranean output. Tarpon Springs became a great center of activity, and the work was carried on mainly by Greeks, who adopted the newer method of the diving apparatus. Many of the more intrepid divers plunged into water over one hundred feet deep and brought up choicest specimens.

SPONTANEOUS COMBUSTION. Jute, heaps of rags and similar substances, when saturated with oil, turpentine or varnish, and bituminous coal, when moistened with water, often begin to burn without having been ignited by some outside agency. Ignition of this sort is called *spontaneous combustion*. The cause of the fire is the mixing of the carbon and the hydrogen with the oxygen of the air so rapidly as to raise the temperature to the ignition point.

SPONTANEOUS GENERATION, *jen ur a'shun*, or **ABIOTENESIS**, *ab eo jen'e sis*. At various times it has been thought that life could be created or produced from matter not itself alive. As recently as the seventeenth century it was thought that maggots on decaying meat were an example of spontaneous generation. With the rise of the science of bacteriology scientists have come to the con-

clusion that a living organism, no matter how minute, cannot come into existence without ancestry. See MOLD; PROTOPLASM.

SPOONBILL, a wading bird of the heron family. It takes its name from its spoon-shaped bill, which it dips about in the water, picking up marine insects and small shellfish. Spoonbills are shy birds, living in flocks in wooded marshes, usually not far from the mouths of rivers, and on the sea-



SPOONBILL

shore. A beautiful species is the *roseate spoonbill*, found in the warmer regions of the North American continent. The plumage of the bird's body is rosy pink; that of the wings, carmine. The glistening whiteness of the neck extends a short distance on the back. The birds build their nests, which are rough, flat structures of sticks, in low branches. They return year after year to the same breeding places, and owing to this habit they have been easily located and nearly exterminated by plume hunters. In the United States the name spoonbill is sometimes given to the shoveler duck.

SPORE, *spohr*, in botany, a minute cell body by means of which reproduction of seedless plants is carried on. A typical spore is a mass of protoplasm with a nucleus and cell wall. Plants that reproduce by spores are called cryptogams (see BOTANY, page 516), and are represented by the algae, ferns, mosses and lichens. There are two main classes of cryptogamous plants—those containing green coloring matter, or chlorophyll, essential in the production of plant food; and those that are parasites and derive their nourishment from the plants on which they grow. Among the parasites are corn smut and wheat rust. In the higher cryptogams reproduction proceeds in much the same way as it does among lower orders of seed-bearing plants. Among the lower cryptogams reproduction is frequently a matter of cell division.

SPOTTSYLVANIA COURT HOUSE, *spot sil va' ni a*, BATTLE OF, a battle of the

Civil War, fought in May, 1864, near Spottsylvania Court House, Va., about fifty miles from Richmond, between a Federal force under Meade and the Confederate Army of Northern Virginia under Lee. After the battle in the Wilderness, Grant had ordered a movement around Lee's right wing to Richmond. Lee, however, was prepared for this maneuver and was in formation at Spottsylvania before Grant reached that



SPOTTSYLVANIA COURT HOUSE

point. The contest was opened by the Federal General Hancock, on May 7, and the fighting was continued intermittently until May 12. The Federal losses at Spottsylvania were nearly 7,000; the Confederates lost more, but held their position. It was in the course of this battle that General Grant sent his famous dispatch to General Halleck at Washington: "I propose to fight it out on this line if it takes all summer." See CIVIL WAR IN AMERICA.

SPRAIN, *sprane*, an injury to a joint in the body by which the ligaments holding the bones in place are strained or torn. The ankle because of the great weight it sustains is the joint most frequently injured by a sprain. Sprains in some joints are much more difficult to heal than in others. Inflammation, swelling and pain follow a sprain and sometimes are exceedingly severe. The application of hot or cold water will often take out the soreness, and complete rest will bring a cure, unless the ligaments have been so badly torn that splints are necessary, as in a case of fracture. In such cases the use of strips of adhesive plaster put on before swelling becomes serious will often do away with the necessity for splints or a plaster cast.

SPRAT, a small fish of the herring family, rarely more than six inches long. At one time the sprat was thought to be the young of the herring, the pilchard or the shad, but it can be easily distinguished from the young of

any of these fishes by means of the sharply-notched edge of the abdomen. It is found in the North Atlantic and Mediterranean and on the southern coasts of the United States. It is considered a delicious, well-flavored and wholesome fish.

SPRING, the season of the year between winter and summer, beginning with the vernal equinox, about March 21, and ending with the summer solstice, about June 21.

SPRING, a stream of water flowing from the earth. Springs have their origin in the water that falls upon the earth in the form of rain or snow, which sinks through porous soils till it arrives at a layer of rock through which it cannot pass, where it forms subterranean reservoirs at various depths. When the pressure of the water which fills the channels through which it has descended is sufficient to overcome the resistance of the overlying mass of the earth, the water breaks through the upper strata and gushes forth in a spring. It may find some natural channel or crevice through which to issue.

In descending and rising through various mineral masses, the water of springs often becomes charged with gaseous, saline, earthy or metallic substances, as carbonic acid gas, sulphureted hydrogen gas, nitrogen, carbonate of lime, silica and carbonate of iron. When these substances are present in considerable quantity, the springs become what are known as *mineral springs*, of which Saratoga Springs, New York, and the springs of Carlsbad, Bohemia, are good examples (see MINERAL WATERS). Warm and hot springs are common, especially in volcanic countries (see THERMAL SPRINGS).

Some springs run for a time and then stop altogether, after a time run again and again stop; these are called *intermittent springs*. Others do not cease to flow, but discharge a small quantity of water for a certain time and then give out a greater quantity; these are called *variable springs*. Springs are most numerous in mountainous and hilly regions, where the underground water finds ready outlets. See ARTESIAN WELL.

SPRING, an elastic body used for relieving concussion, for furnishing motive power, or for controlling the motion of machines. Springs are made of various materials, such as steel wire, coiled spirally; steel rods or plates or strips of steel, suitably joined, as in the springs for carriages and railway cars; masses of India rubber, which, because of its

elasticity, will resume its former position as pressure is removed.

There are many patterns of springs, ranging from the delicate hairspring in the watch to the heavy springs found in locomotives. In the ordinary gunlock, the spring imparts motion to the hammer by being suddenly released from a strong tension. In the spring balance, the spring indicates the weight of the object placed on the scale pan. In the safety valve, it indicates the pressure of steam in a boiler and causes the valve to open at the proper time. Numerous other uses of the spring are also common.

SPRINGBOK, a species of antelope, closely allied to the gazelle, formerly found in vast herds in South Africa. Both the flesh and the hide are valuable, and it is therefore much hunted. It is a beautiful animal, of graceful form and fine colors—dull brown on the upper parts and pure white beneath,



SPRINGBOK

with a broad band of deep red where the colors meet on the flanks, and a white band extending down the back. It is larger than the roebuck, and its neck and limbs are much longer and more delicate. The horns are slightly curving and are small in the female.

SPRINGFIELD, ILL., the capital of the state, the fifth city in size, ranking after Chicago, East Saint Louis, Peoria and Rockford, and the county seat of Sangamon County. It is 185 miles southwest of Chicago, on the B. & O. Southwestern, the Chicago & Alton, the Illinois Central, the Chicago, Peoria & Saint Louis, the Cincinnati, Indianapolis & Western and the Wabash railroads. The city is compactly built and regularly laid

out, with wide, beautiful, shaded streets. The most prominent structure is the state capitol, with a massive dome, 364 feet high. The magnificent Lincoln monument and mausoleum, which contains the remains of the martyred President, his wife, two children and one grandson, is located about a mile and a half from the capitol, in Oak Ridge Cemetery. The old capitol, now serving as the county courthouse, and the Lincoln residence, which is owned by the state, are interesting features.

The educational institutions include the Bettie Stuart Institute, Concordia Seminary, Saint Agatha's School, the Sacred Heart Academy and two business colleges. Other important buildings are the governor's mansion, a city hall, a postoffice, an Odd Fellows' Temple, an orphanage, two hospitals and a sanitarium. There are city, state and supreme court libraries and those of the State Historical Society, the Lincoln Library, and the Illinois State Museum of Natural History. A state fair is held here annually. The surrounding country is a rich farming and coal-mining region; the well-known Springfield watches are made here, and there are engine and boiler works, car shops, lumber mills, foundries, machine shops and other factories. Springfield was settled in 1819, was chosen as the county seat in 1823, was incorporated as a town in 1832, was made the state capital in 1837 and was chartered as a city in 1840. The commission form of government was adopted in 1911. Population, 1910, 51,678; in 1920, 59,183.

SPRINGFIELD, Mass., third city in size in the state and the county seat of Hampden County, is about 100 miles nearly west of Boston and 136 miles northeast of New York City, on the Connecticut River and on the Boston & Albany, the Boston & Maine, the Central New England and the New York, New Haven & Hartford railroads. It is a beautiful city and an attractive residence place, with wide and well-shaded streets.

Forest Park covers an area of 1,000 acres, and there are numerous smaller parks and public squares. These squares contain soldiers' and sailors' monuments, statues of Miles Morgan and President McKinley and Saint-Gaudens's remarkable statue of *The Puritan*. Springfield has often been called "the City of Homes," for a smaller percentage of the population live in rented houses than in almost any other New England city.

Especially noteworthy among buildings is a municipal group, consisting of an auditorium, an administration building and a campanile. The tower contains a chime of twelve bells. This chime is linked up with the Municipal Clock so that it rings every quarter of the hour. The Municipal Building which has a reputation of being one of the most beautiful in America, contains all the administration offices of the city and an Auditorium seating 4,000 people and has one of the finest concert organs in the country. The acoustics in this building have been pronounced to be perfect. Among other structures of note are the Carnegie Library, an art museum, a science museum, a county courthouse, Church of the Unity, a Federal building, a union railroad station, a county law library, a hall of records, and a federal building. Hampden County is also proud of its new \$6,000,000 bridge, crossing the Connecticut River, dedicated "To the Boys".

Springfield's educational system is rated as one of the best and has a national reputation. It consists of high schools, junior high school, grammar schools, and primary schools. There are also evening schools and vocational training schools. The higher institutions of learning include the International Y. M. C. A. Training School, the American International College, two boarding schools for girls and three business colleges. The city is an insurance center, the home of the Springfield Fire and Marine Insurance Company and the Mass. Mutual Life Insurance Company.

The United States Arsenal was established here by Washington in 1795, and it employs in peace time between 1,400 and 3,000 men. Springfield products which enjoy a national reputation are, magnetos, candy machines, wrapping machines, paper, rugs, knit goods, automobiles, motorcycles, radio and electrical equipment, guns, revolvers, educational games, athletic equipment, and art goods.

William Pynchon settled Springfield in 1636. During King Philip's war, it was attacked and burned, October 4, 1675. It was the scene of a riot in January, 1787, between the state troops and Shay's insurgents. The city was chartered in 1852. Population, in 1920, 129,338.

SPRINGFIELD, Mo., the county seat of Greene County, 204 miles southeast of Kansas City, on the Saint Louis & San Francisco, the Kansas City, Clinton & Springfield, the Saint Louis, Iron Mountain & Southern and

the Missouri Pacific railroads. It is located on a broad plateau in the heart of the Ozarks, at an altitude of 1,140 feet, and is in the mineral belt of Southwestern Missouri. It is also the center of an extensive poultry industry, with annual shipments amounting to \$8,624,000. The leading manufacturing establishments are lumber and flour mills, furniture and wagon factories and railroad and reclamation shops. Drury College, Loretto Academy and a state normal are located here. A ten-story office building, the Frisco building, a court house, a Pythian home, a Federal building, a Carnegie Library, three hospitals, zoölogical gardens and a large national cemetery are interesting features. The place was settled about 1819 as an Indian trading post, and was incorporated in 1833. The commission form of government was adopted in 1916. Population, 1920, 39,620.

SPRINGFIELD, OHIO, the county seat of Clark County, forty-five miles west of Columbus, on Lagonda Creek and Mad River, and on the Erie, the Cleveland, Cincinnati, Chicago & Saint Louis, the Detroit, Toledo & Ironton, and a number of electric railroads. The city is in a fertile farming district, has good water power and is a center for the manufacture of agricultural implements. It produces 90 per cent of the piano plates used in the United States; in its greenhouses it grows more roses than any other city in the country. Other prominent industries are motors and motor trucks, paper making and publishing. Wittenberg College is located here, and the city has a ladies' seminary, and two business colleges. Noteworthy structures are a city hall, a Federal building, a courthouse, the Bushnell Library and a Y. M. C. A. building. Near the city are state homes of the Masons, Odd Fellows and Knights of Pythias, and Memorial Home for Aged Women. The town was laid out in 1801, and was chartered as a city in 1850. Population, 1920, 60,840.

SPRUCE, the name of a group of trees of the conebearing family, characterized by evergreen leaves, tall, tapering trunks and slender, horizontal branches. The leaves are stiff and pointed, and are arranged around the branch in a spiral. The bark is a dark or reddish brown, and is scaly. There are several spruces, of which the following are the most valuable:

The *Norway spruce* yields the valuable timber known under the name of *white*, or

Christiania, deal. It is a native of a large part of northern Europe, and is a noble tree, of conical habit of growth, reaching sometimes the height of 150 feet. The *white spruce* and the *black spruce* are both natives of North America. The latter attains the height of seventy or eighty feet, with a diameter of from fifteen to twenty inches. Its timber is of great value, on account of its strength, lightness and elasticity, and it is often employed for the yards of ships, the sides of ladders and very extensively in making paper pulp. The *Douglas spruce*, known among lumbermen as *Oregon fir*, is found in the northwestern part of North America, extending from Oregon into Alaska. It reaches a height of 100 to 150 feet, and next to the giant sequoia is the largest tree in America. Its lumber is valuable for many purposes. See HEMLOCK.

SPURGE FAMILY, or EUPHORBIA-CEAE, *u for be a'se ah*, a group of herbs, shrubs and trees, widely distributed over the globe and comprising about 4,000 species.



EUPHORBIA

Most of them have a biting, milky juice, which is of high commercial value, being the source of castor oil, croton oil, cassava and rubber. The plants have small, inconspicuous flowers, but some of them, notably the poinsettia, have brightly colored bracts. Some of the plants resemble cacti. The fruit, which is three-lobed, is dry and rather fleshy. Most of the tropical species are known as Euphorbias.

SPURGEON, *spur'jun*, CHARLES HADDON (1834-1892), a celebrated English preacher,

born at Kelvedon and educated at Colchester. When he was but a boy he began to preach, after having joined the Baptist Church; and in 1854 he became pastor of a chapel in New Park Street, London. Soon great crowds were going to hear him, and in 1861 the great Metropolitan Tabernacle, with 6,000 seats, was built to accommodate his large audiences. Here he preached for the remainder of his life.

CHARLES HADDON
SPURGEON

Besides his ordinary ministrations and the publication, after 1855, of a weekly sermon, he founded many benevolent societies, including the Stockwell Orphanage and the Pastors' College. In 1887 he severed his connection with the Baptist Union, on account of what he called the "down grade" tendency of the Church. He was the author of numerous volumes, of which the best known are *The Saint and his Savior*, *John Ploughman's Talk*, *Feathers for Arrows*, *The Treasury of David*, *Types and Emblems*, *The Metropolitan Tabernacle Farm Sermons*, *The Present Truth*, *Storm Signals*, *Salt Cellars*, *Speeches at Home and Abroad*.

SPY, in military usage, any person who by deception obtains or attempts to obtain information concerning a belligerent for the benefit of the enemy. A person is considered a spy only when he acts under false pretenses. A soldier who, for the time being, discards his own uniform and puts on the uniform of the enemy or some other disguise in order to penetrate the enemy's line is, according to international rules of warfare, a spy. If caught in the act he may be put to death after having received a fair trial and been proved guilty. No soldier or civilian is considered a spy who openly carries out a mission such as delivering a message across an enemy's territory, or reconnoitering over it in aeroplane or balloon. That which constitutes an enemy a spy is an act of deceit.

SQUADRON, a regulated arranged military body, specifically one of the divisions of a cavalry regiment, usually composed of

four troops. It is commanded by a major and includes from 120 to 200 men. The term is also applied to two or more war vessels detailed under a single command. See **ARMY**.

SQUARE, in geometry, a figure with four equal sides and equal angles. This figure is considered the unit for the measurement of areas, though actually the unit of area measurement is no longer considered to be perfectly square, but merely to contain the same amount of surface space as would a square figure whose sides were of the length of the corresponding linear unit.

To *square* a figure, a polygon, for example, is to reduce the surface to a square of equivalent area by mathematical means. This can be done by finding the area of the polygon and extracting the square root, the result being one side of the required square. To square a circle is impossible, but the attempt to do so was one of the first problems to engage the attention of the mathematicians of antiquity. In arithmetic and algebra the square of a number is the product obtained by multiplying a number by itself. Thus, 64 is the square of 8, for $8 \times 8 = 64$.

SQUARE MEASURE, the system of measurement used in measuring surfaces. It derives its name from the *square unit*, upon which the system depends. All measurements are based upon the square, and the area of any figure is found by resolving it into an equivalent square or rectangle. The two underlying principles of square measure are:

1. The area of a rectangular surface is equal to the product of its length by its breadth, expressed in square units.

2. When the area and one dimension of a rectangular surface are given the other dimension is equal to the quotient derived by dividing the area by the given dimension. See **MENSURATION; WEIGHTS AND MEASURES; METRIC SYSTEM**.

SQUARE ROOT. See **ARITHMETIC**, material for eighth year.

SQUASH, *skwosh*, a garden vegetable belonging to the gourd family. The plants, which are tough and robust, with large leaves and small yellow flowers, occur in two varieties, one a trailing vine, the other a bush. The *summer* squash, a bushy plant, produces a thin-skinned fruit, gourd-shaped or shaped like an acorn in its cup and sometimes twenty inches in diameter. *Winter* squash, usually of the vine variety, has a larger fruit, thick-skinned, which matures in the fall and,

when properly stored in a dry cellar, keeps through the winter.

Squash Bug, a name given to two species of insects, best known as destroyers of squash, pumpkin and other similar plants. The species which is particularly destructive in the United States is a cylindrical ill-smelling beetle, about half an inch long, with wing cases striped with black and yellow. The adults, dormant in winter, produce young in the spring, and these feed on the sap of the young plants. Killing the old bugs before the eggs are laid is a preventive outweighing any other remedy.

SQUATTER, *skwo'tur*, **SOVEREIGNTY**, or **POPULAR SOVEREIGNTY**, terms used in American history to denote the right of the inhabitants of any territory to govern themselves without Federal interference. The first term specifically relates to that right as applied to an unorganized territory, inhabited by so-called "squatters," that is persons who had taken up land without purchasing titles.

The doctrine of "squatter sovereignty" assumed importance during the slavery controversy, when it was championed especially by Stephen A. Douglas, who incorporated it into the Kansas-Nebraska Bill. In this bill it was declared that the people of the territories should have the right to decide whether slavery should be admitted or excluded. Though the theory was first proposed in order to protect the rights of slaveholders and to allow the extension of slavery, it was ultimately repudiated by the South, which was upheld by the dictum of Chief Justice Taney in the Dred Scott case. It finally led to a division between the Northern and Southern Democrats.

SQUID, *skwid*, a popular name for many species of ten-armed animals, especially the cuttlefish. The animal has a tapering body and a fin on each side of the tail. Some are of a bluish color, speckled with purple. The American squids range from Newfoundland to the Virginia coast and are much used as bait by codfishers. Excepting the cuttlefish, they are of no economic value.

SQUILL, a plant native to the Mediterranean shores and popularly called *sea onion*. It has large bulbs of medicinal value. Squill, formerly used in cases of croup and other bronchial affections, has been largely superseded by other remedies which are less stimulating to the heart and less irritating to the stomach and intestines.

The plant belongs to the lily family, has a spreading perianth, an ovary of three parts; in a three-cornered capsule are cells containing the seeds.

SCQUINTING, or **STRABISMUS**, *strabismus*, a defect of sight in which the axis of vision in one eye is turned from its proper position in relation to the other. Individuals so afflicted are said to be cross-eyed. The normal position of the eye and its direction towards objects are controlled by four straight muscles; one is attached above the eyeball, one beneath, and one on either side. If one of these muscles becomes paralyzed, that on the opposite side turns the eye out of its proper position and causes squinting. If one eye is defective or deformed, squinting is apt to arise from overstraining. The trouble is overcome by an operation, or by proper fitting of glasses; sometimes both methods of treatment are required.

SQUIRREL, the name given to a large family of small attractive rodents, or gnawing animals. Squirrels are usually of a rich, ruddy brown or a dark gray on the upper parts, merging into reddish or grayish-white on the under parts of the body; the color, however, varies with the season and climate. The head is large, and the eyes are projecting and bright. These animals are found in all parts of the world except Australia, although much more numerous in America than in Europe.

Kinds of Squirrels. *Tree squirrels* are light and agile little creatures, with strong jaws, sharp teeth and long bushy tails. *Ground squirrels* do not ascend trees but burrow in the ground; the *chipmunk* is the best-known ground squirrel. The *common squirrel* inhabits Europe and the north of Asia; while the *cat squirrel*, the *gray squirrel*, the *black squirrel*, the *red squirrel* and the *great-tailed squirrel* are American



SQUILL

species. The *red squirrel*, or *chickaree*, is the most widely distributed of American squirrels; it is characterized by a shrill, noisy clattering. One oriental species is remarkable because it is the only animal which assumes a purely ornamental coat in the breeding season. It is gray in the summer and takes on a brilliant orange coat in early winter, changing to gray again in early spring.

Squirrel Habits. Squirrels subsist on nuts, acorns and seeds, of which they lay up a store for winter in hollow trees or in the earth. When engaged in eating, they sit on their haunches, with their tails thrown upward on the back, in which position they grasp the food with their fore paws and gnaw it with their powerful teeth. Their nests, which consist of woody fiber, leaves and moss, are usually located in the forks of trees. The young, of which there are three or four to a litter in a season, are born in June. The fur of some of the American



RED SQUIRREL

species, especially those of the north, is an important article of commerce. See **FUR AND FUR TRADE**.

STABAT MATER, Latin phrase meaning *the Mother Stood*, is a celebrated thirteenth-century hymn describing the sufferings of the mother of Christ as she stood by the Cross. The words, in Latin, are attributed to Jacopone da Todi, a follower of Saint Francis. The poem has been set to music by a number of composers, including Palestrina, Pergolesi, Haydn, Rossini and Dvorak.

STADIUM, the name originally given to the race course of Olympia, Greece, where athletic contests were held, and later ap-

plied to all places throughout Greece where such games were celebrated. The track was elliptical in shape, and about 600 feet long. At one end was a building with accommodations for the athletes; the remainder of the surrounding space was arranged in terraces or tiers of seats for the spectators. The word *stadium* was also used by the Greeks to denote a measure of distance, corresponding to the distance between the two terminal pillars of the race course. It was equivalent to a Roman mile.

The Athenian stadium was restored in 1906 for use in the revival of the Olympic games. Several other modern structures on the same plan have been erected, notably that at Harvard University, with a seating capacity of 40,000.

STADTHOLDER, *stad'holder*, a title formerly given in the Netherlands to the chief executive. In 1580, when Holland and Zealand revolted against Spain and united to accept William, prince of Orange, as their ruler, they called him *stadtholder* (literally, *one who holds a city*). Upon the assassination of Prince William, the title was conferred on his son, Prince Maurice, and it remained as the title of the ruler until Holland was annexed by France, in 1802. It was finally dropped in 1814, when the Prince of Orange was declared king of the Netherlands.

STAEL-HOLSTEIN, *stah'el hole'stine*, ANNE LOUISE GERMAINE, Baroness de, known in history as *Madame de Staël* (1766-1817), one of the most brilliant figures of eighteenth-century France. The daughter of Jacques Necker, Minister of Finance to Louis XVI, she was carefully educated and brought up in the most intellectual atmosphere of her time. In 1786 she married Baron de Staël-Holstein, Swedish ambassador at the French court. The marriage was not happy, and resulted in a friendly separation.

In 1788 Madame de Staël printed her *Letters on Jean Jacques Rousseau*. At the outbreak of the Revolution she exercised considerable political power, by reason of her father's high position at court and because of her own wit and womanly charm. To escape the Reign of Terror she fled to her father's estate in Switzerland, after vainly endeavoring to save her friends and the royal family. Afterwards she returned to Paris, where she again became an influence in politics. Subsequently she was banished by

Napoleon, on account of her bold advocacy of liberal views. Her husband died in 1802, and in 1811 she secretly married a young officer, De Rocca. This second marriage became known only after her death. Among her writings are the novels *Delphine* and *Corinne*, *On Germany*, *Thoughts on the French Revolution* and *Ten Years of Exile*.

STAFF, in military and naval usage, a body of officers not having command but attached in an advisory or executive capacity to a commanding officer. In the United States in time of war each military unit larger than a company—that is an army, a corps, a division or a brigade—has its headquarters and staff; each garrison, or body of troops stationed at a fort, also has its staff. A headquarters staff of an army in the field comprises a personnel staff of two or more aides-de-camp; ten officers, one of whom is *chief of staff*, and an adjutant-general, with his assistants. The composition of a garrison staff depends on the size of the garrison.

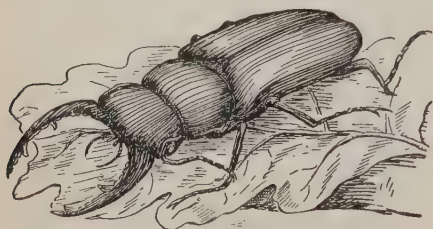
General Staff. This is a central administrative body created by Act of Congress in 1903. It is made up of four general officers, one of whom is chief of staff, four colonels, six lieutenant-colonels, twelve majors and twelve captains. It has supervision over all the bureaus of the War Department and considers all questions affecting the efficiency of the army. The chief of staff is the military adviser of the Secretary of War.

STAFF, a plaster resembling stucco, used as an outside covering for buildings and relief ornament. It is a mixture of plaster of Paris and hydraulic cement, and contains some dextrin and glycerine. Staff was used for covering the buildings of the Paris Exposition in 1889, the World's Columbian Exposition at Chicago in 1893, the Louisiana Purchase Exposition at Saint Louis in 1904 and those of the two California Panama Pacific expositions. It is comparatively cheap and light and can be molded into any desired form, but it is not suitable for the exterior of permanent buildings, as it lasts only a short time. See CEMENTS.

STAG, the name applied to the male of several species of deer, but commonly restricted in its application to the male of the red deer, after the animal has reached the age of five years, the age being indicated by the horns, which branch when it is fully mature. The female is called a *hind*, the young a *calf*. The full-grown stag is about four

feet high at the shoulders. His antlers, about three and a half feet long, constitute a dangerous weapon. They are shed annually, after the breeding season. In summer the back and flanks of the animal are yellowish-brown; in winter they are reddish-brown. These deer feed on grass, buds and young shoots of trees. The stags and hinds congregate in herds; old stags, called *harts*, roam alone. The North American *wapiti* is a related deer. See **DEER**.

STAG BEETLE, one of a large group of beetles, many species of which are found in North America. The male has enormous horny and toothed mandibles, which bear a certain resemblance to stag antlers. The



GIANT STAG BEETLE

giant stag beetle of the Southern states has mandibles an inch long, one third the length of the body. These beetles feed on the tender leaves and other succulent parts of plants. The eggs are deposited on trees, in the crevices of the bark, and when they hatch the small white worms burrow under the bark and feed on the soft substance beneath it, often causing the bark to peel off.

STAG HOUND, a large, powerful white hound, marked with black and tan, and probably bred from the bloodhound. As the name indicates, these dogs were formerly used for hunting deer. They have been largely replaced by foxhounds.

STAINED GLASS, glass colored in the making by some special chemical process or by the application of pigment to the surface of the finished article. Formerly all colored glass used in decorative windows was colored in the molten state. The molded glass was cut in shapes required by the design and the pieces were put together by means of lead strips. Such was the method in medieval times. To-day better results are achieved by painting, by graduating the thickness of glass, thus producing the effect of shading, and by fusing together colored slabs on a larger plate of colorless glass. All these devices obviate the necessity of breaking

the design up with numerous joining leads, and make possible larger panes of glass. The United States produces the best stained glass in the world. This is largely owing to the experiments of two men—John La Farge and L. C. Tiffany.

The effects obtained in the best stained glass of the present time surpass anything formerly achieved in this branch of art. It is chiefly in designs containing human figures that progress has been most marked. The soldered leads which formerly cut the figure into bits can now be made to coincide with the structural lines, and the effect is one of greater unity and coherence. Moreover, greater advance has been made in the perfection of color and in adapting it to opaque and translucent uses. Whereas in other periods stained glass was employed almost exclusively in connection with ecclesiastical architecture, it is to-day found in every type of public building and in some of the finest residences. The stained glass industry in the United States represents an investment of about \$3,000,000.

STALACTITE, *stalak'tite*, a beautiful formation on the roofs of caves caused by the action of water containing lime, silica and iron. The water percolates through the rock, and as it evaporates, these substances solidify. Stalactites usually take the form of icicles, but occasionally they form columns extending from the roof to the floor of the cavern. Similar masses of small size are frequently to be seen, also, hanging from stone bridges. Simultaneously with the formation of the stalactite, a similar but upward growth, called a *stalagmite*, takes place at the spot where the successive drops of water fall and evaporate. See **CAVE**.

STALAGMITE, *stalag' mite*. See **STALACTITE**.

STAMFORD, CONN., a city in Fairfield County, thirty-three miles northeast of New York City, on Long Island Sound and on the New York, New Haven & Hartford railroad. The location is attractive, and many New York business men have their homes here. There is regular steamship connection with New York City. The place is well known for its manufacture of locks and keys, and it also produces drugs, dyestuffs, pianos, typewriters, insulated wire, paints, wood-working machinery, and foundry and machine shop products. It contains the Ferguson Library, a city hospital, Saint John's

Hospital and Home and several private sanitariums. Stamford was settled in 1641 by a company from Wethersfield, on the site of an old Indian village called Rippowam. It was made a borough in 1830 and was chartered as a city in 1894. Population, 1910, 25,138; in 1920, 35,086.

STAMMERING, a defect of speech due to lack of proper control of the muscles used in vocal articulation. It occurs in a number of forms, one that is most common being *stuttering*, which is rapid repetition of monosyllables or initial syllables of words beginning with *p*, *b*, *t* or *d*. Less frequent are the cases in which syllables are dropped, or those in which the afflicted person is momentarily stricken dumb. It is believed by some that the tendency to stammering is inherited, but the probabilities are that cases of stammering develop in children as the result of association rather than of heredity.

As in all other cases of nervous troubles, stammering can often be overcome. Sometimes it is found to be the resulting accompaniment of faulty eyesight, adenoids or other physical defect or ailment. A stammering child should have medical examination, and if the cause is physical and can be removed it should have attention, since to neglect treatment may be to allow a habit to become fixed, whereas timely aid may result in a cure. Stammerers always receive help by practicing breath control, and frequently by singing lessons. They need all the coöperation they can get from their fellows, for there is nothing quite so bad for one who stammers as the self-consciousness resulting from ridicule and impatience on the part of those around them.

STAMP, a small bit of paper bearing an imprint authorized by law and intended to be attached by a coating of gum to a dutiable or taxable article. Under the excise laws internal revenue stamps are required on snuff, tobacco and cigars; and in times of war many articles of commerce require revenue stamps. Sometimes legal documents also require government stamps and are void without them. At all times letters, papers or packages to be transmitted by mail must be stamped. See INTERNAL REVENUE; POSTAGE.

Stamp Act, an act regulating the imposition of stamp duties; specifically, an act passed by the British Parliament in 1765, requiring all legal documents, commercial papers and newspapers to be written or

printed on paper stamped by the British government.

After the close of the French wars there grew up in England a feeling that taxes ought to be raised in America as a contribution to the war debt, and for the military defense of the colonies. The colonies expressed their willingness to be taxed by their own representatives in colonial assemblies, but declared they would not be taxed by Parliament—a body in which they were not represented; that taxation without representation was unjust.

The Stamp Act was proposed in March, 1764, and was passed in March, 1765. When the news was received in America, riots in opposition broke out. In October the colonies held a convention and sent an address to the king, acknowledging his sovereignty, but denying the right of Parliament to tax them. In March, 1766, the Act was repealed, but the taxing power of Parliament was reiterated. This episode was one of the immediate causes of the war of the American Revolution.

STANDARD OIL COMPANY, a combination of American companies formed for the purpose of controlling the petroleum industry. Before its dissolution in 1911 by the United States Supreme Court, it was considered the most powerful industrial organization in the world. In 1909 suit was brought in the United States Circuit Court at Saint Louis for the dissolution of the company, on the ground that it was a combination in restraint of trade, and that its existence was in violation of the Sherman Anti-Trust law (see TRUSTS). The court ordered the company dissolved within thirty days, but the case was appealed to the Supreme Court, and a final decision was not reached until 1911, when the Supreme Court affirmed the decision of the lower court, but gave the company six months to adjust its affairs.

At the time of this decision the Standard Oil Company of New Jersey, as it was legally known, controlled about seventy oil companies. The dissolution did not discontinue the Standard Oil Company; it compelled this company to release its control over the other companies, and this was accomplished by relinquishing its ownership of the stocks of these companies to the former stockholders. However, since the holders of the majority of the stock in these companies were the men who controlled the Standard Oil



STANDARD TIME CHART FOR CANADA
Showing boundaries and differences in time.

Company, the dissolution had but little effect upon the methods employed in carrying on the various branches of the petroleum industry.

The Standard Oil Company was the outgrowth of organizations and methods originated and perfected by John D. Rockefeller and his associates in the petroleum industry. The first steps leading to it were taken in 1867, soon after the industry began to assume large proportions.

STANDARDS, UNITED STATES NATIONAL BUREAU OF, a bureau of the Department of Commerce of the United States government, which has custody of the national standards of weights and measures. The Bureau of Standards was organized in 1901, to take the place of the Office of Standard Weights and Measures. It is in charge of a director, who employs such assistants as the work of the Bureau may require. The law establishing the Bureau requires the director to compare the national standards of weights and measures with those used in commerce, engineering, scientific investigations and educational institutions, and in the construction or reproduction of these standards, or their multiples and subdivisions, and to determine the material best suited for such standards. The material selected should be such that will

not change its dimensions with a change of temperature, will not absorb moisture, and will not rust, since changes produced by any of these agencies impair the value of the standard.

The national standards of length and mass are kept in a fireproof vault in the building of the Bureau at Washington. They consist of two platinum-iridium meter bars and two standard kilograms of the same material, and were made in France.

The Bureau is organized into the divisions of Weights and Measures, Heat and Thermometry, Electricity, Optics, Structural Engineering and Miscellaneous Materials, Engineering Research and Metallurgy. The staff includes about 150 members, and their services are in constant demand, since the Bureau must test the measuring devices for the various departments of the government and their bureaus and make investigations where ordinary commercial testing facilities are lacking. It is required to prepare official specifications for much of the material purchased by the government and to test the material when purchased. It issues a number of publications of high scientific value, issues bulletins, and maintains a special laboratory at Pittsburgh for testing structural materials.



STANDARD TIME CHART FOR THE UNITED STATES

Adopted in 1919.

STANDARD TIME, the system of time-reckoning adopted by law or by general usage over a certain region. The turning of the earth on its axis from west to east causes a constant difference in sun time between places at different meridians; when it is noon at one place, it is afternoon at places to the east of that point, and forenoon at places farther west. This fact gives rise to many complications, especially in the operation of railroads, so for convenience an arbitrary system of time-reckoning is necessary.

In the United States. Previous to 1883 travelers were greatly inconvenienced by reason of the fact that every great railroad was run on a time system which might differ from that employed by any other railroad. For instance, a line of road from New York to Chicago would have to have all the watches of its employes set exactly alike. This made it impossible that over the entire thousand miles of line each employe could keep his watch regulated by local time. The road might declare that it would run its trains by New York time, which is about forty minutes faster than Chicago time. All employes' watches, then, along the entire line of road had to constantly register New York time,

regardless of the location of the employe. Another railroad running from Chicago to Denver might adopt Chicago time as its standard, or might choose to run on Denver time; or, if so determining, could select Omaha time, as that city is nearly midway between the two terminals.

Such conditions on all railroads could result in nothing short of confusion. A traveler might reach Denver from the east at 6 p. m., according to the schedule of the railroad on which he was riding. He might desire to go farther west than Denver, and would find that the train he wished to take left that city at 5:30 p. m. In the absence of a common standard of time adopted by these two railroads, this traveler would not know whether the departing 5:30 train left Denver at 5:30 by the time of the first railroad, or whether 5:30 meant a half-hour or an hour earlier or later than the time on which the first road was run.

This condition of things led to a conference in 1882 and resulted in the adoption through the United States and Canada of what is known as *standard time*. The first and most easterly division is termed Atlantic standard time, and embraces that territory which lies

7½° each side of the 60th degree of longitude. The standard time for the entire territory embraced within its limits is the local, or sun, time of Halifax.

The next division toward the West is embraced within the section called Eastern standard time, the 75th meridian being almost in its center; the time throughout the Eastern section is that of the 75th meridian, which is practically the local time of the city of Washington.

The next division toward the West embraces the great valley of the Mississippi, and here is the division of Central standard time; the meridian running nearly through the center of the Central territory is the 90th. The official time in the Central division is therefore practically the local time of the city of St. Louis, and is one hour earlier than the time in the Eastern division.

The next group of states to the West are joined in what is known as Mountain standard time, and the central portion is on the meridian of 105°, which is the location of the city of Denver. Therefore Denver local time is the standard time for the Mountain division; it is one hour earlier than Central time, and two hours earlier than Eastern.

Beyond the Mountain division is the final group of states, wherein Pacific standard time prevails; the meridian of longitude which establishes time for the Pacific division is the 120th. This is very close to Carson City, Nevada. Throughout this division the time is one hour earlier than in the Mountain division.

Railroads having adopted for all their purposes the standard time of the sections through which they run, citizens, in their business enterprises, have very largely fallen into line, and local or sun time is scarcely taken into consideration. For years after the adoption of standard time rural communities refused to change their watches and clocks, and therefore a double system of time prevailed. It took many people a long time to realize how easy it would be to turn their watches and clocks forward or backward the required number of minutes to harmonize them with the standard time of their section and then forget that such action was taken. Wherever this has been done, absolutely no change whatever has been necessary in manner of living or conduct of any enterprise.

In Canada. Canada is divided into zones of 15 degrees, extending 7½ degrees on each

side of the central meridians, and the central local mean time is used for all places within that zone. Thus the first and most easterly Canadian division, known as Atlantic time, includes the territory which lies 7½ degrees each side of the sixtieth degree of longitude. The standard time for the entire zone is the local or sun time of Halifax (four hours behind Greenwich time). Largely through the efforts of Sir Sandford Fleming, between the years of 1876 and 1881 the adoption of this plan was kept before the public and the government, with the result that since 1883, when a General Time Convention was held in Chicago, standard time has been in use on all railroads in North America. Besides the Atlantic zone, there are four other divisions of time in Canada which correspond with those of the United States.

The time throughout the Eastern section is practically the sun time of Ottawa. The official time in the Central division is practically the local time of the city of Port Arthur and is one hour earlier than the time in the Eastern division. Regina local time is standard time for the Mountain division; it is one hour earlier than Central, two hours earlier than Eastern and three hours earlier than Atlantic time.

Beyond the Mountain division is the last section, in which Pacific or Coast time prevails; the meridian of longitude which establishes time for this division is the 120th. The northern part of the boundary between Alberta and British Columbia runs on this meridian, but as there is no large city exactly on the line, Vancouver, 123° 5' W., is made the division point on the railroad. Throughout this division the time is one hour earlier than Mountain time and eight hours earlier than Greenwich time.

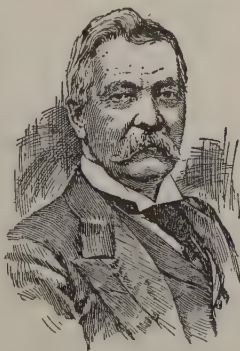
The system of counting time by twenty-four hours instead of twelve is in use on all the Canadian railways west of Lake Superior and also on the Intercolonial Railway between Halifax and Montreal. Thus, twenty o'clock is eight o'clock at night, midnight being the beginning and end of each twenty-four hour period. The twenty-four hour notation is part of the scheme of time reckoning worked out by Sir Sanford Fleming.

STAN'DISH, MILES (1584-1656), an American colonist and soldier, born in Lancashire, England. He served in the English army in the Netherlands, and, though not a member of the Leyden congregation,

sailed with the *Mayflower* colony to Massachusetts in 1620. He became the strongest leader of the Pilgrims in their struggle against the Indians. During the first winter his wife died, and the traditional account of his effort to secure a second wife has been made familiar by Longfellow in *The Courtship of Miles Standish* (which see). In 1625 he was sent on a mission to England, but returned in the following year and settled at Duxbury, Mass., where he died. Standish was the military head of the colony, and for a long time was its treasurer. A monument surmounted by a statue has been erected to his memory at Duxbury.

STANFORD, LELAND (1824-1893), an American capitalist and philanthropist, born in Watervliet, N. Y. He studied law, moved to Port Washington, Wis., and practiced his profession there for three years. In 1852 he went to California as a mining prospector, and after four years established the mercantile business which was the foundation of his subsequent fortune of \$50,000,000. He was one of the promoters of the Central Pacific Railway. In 1861 he was elected governor of California, and from 1885 to 1891 served as United States Senator from California. He will be remembered chiefly as the founder of Leland Stanford Junior University, a memorial to his son who died in Rome at the age of sixteen. See **LELAND STANFORD JUNIOR UNIVERSITY**.

STANLEY, HENRY MORTON, Sir (1841-1904), an African explorer, born at Denbigh, Wales. His father, John Rowlands, died when the boy was but two years old. In 1857 he shipped as cabin boy to New Orleans and was there adopted by a merchant, whose name he assumed. Stanley enlisted in the Confederate army, and was taken prisoner in the Battle of Shiloh. He escaped, and after a visit to his home in Wales he volunteered into the United States navy and became an ensign on the ironclad *Ticonderoga*. At the close of the war he went West as a newspaper correspondent, and as correspondent for



HENRY MORTON
STANLEY

the New York *Herald* he joined the Abyssinian expedition of 1868. He afterward traveled in Spain, and it was while there in 1869 that he was commissioned by the proprietor of the New York *Herald* "to go and find Livingstone." After visiting the Crimea, Palestine, Persia and India, he reached Zanzibar in the early part of 1871, and thence he proceeded across Africa, in search of Livingstone (see **LIVINGSTONE, DAVID**). He met and relieved Livingstone at Lake Tanganyika in November of the same year and returned to England. He then acted as the *Herald's* correspondent during the Ashanti War.

As correspondent of the London *Daily Telegraph* and the New York *Herald*, in 1874 he undertook an expedition into Africa, where he explored the equatorial lake region, and traced the Kongo River from the interior to its mouth. For the purpose of developing this vast region he returned in 1879 under the auspices of the International African Association, founded by the king of the Belgians. In this territory stations were planted, steam navigation was established and in 1885 the territory received the name of the Congo Free State. In 1887 Stanley organized an expedition for the relief of Emin Pasha. This time he entered Africa on the west by way of the Kongo; and after a series of extraordinary marches through the forest region, he met Emin Pasha in the neighborhood of Albert Nyanza, and brought the pasha and his followers to the coast. Upon his return to England, in 1895, he became very popular. Having three years previously become a naturalized citizen of Great Britain, he was elected to Parliament and worked earnestly for the development of British interests in Africa. He wrote *How I Found Livingstone, Through the Dark Continent, In Darkest Africa* and *My Dark Companions*. Next to Livingstone, Stanley was the greatest of African explorers.

STANOVoi, stahn o voi', MOUNTAINS, a range of low mountains in Northeastern Asia, extending from the Mongolian frontier to East Cape, on Bering Strait. A spur traverses the peninsula of Kamchatka. The length of the chain is 3,000 miles. Although the highest point, Mount Tehokhondo, is 8,000 feet, the average elevation is not great, the configuration being more in the nature of an elevated plateau. North of parallel 60° the lower slopes are densely wooded; south of this the summits are bare. The

range is rich in minerals, which as yet are little developed.

STANTON, EDWIN McMASTERS (1814-1869), the great American Secretary of War during Lincoln's administration. He was born at Steubenville, Ohio, attended Kenyon College, studied law and was admitted to the bar in 1836. In

1856 he opened a law office at Washington, D. C., where he acquired a large practice before the Supreme Court. He became attorney-general in 1860. Shortly after the outbreak of hostilities between the North and South, President Lincoln ap-

pointed him head of the War Department, and his acceptance of the office marked the beginning of a vigorous military policy. After Lincoln's death he remained in the Cabinet, but soon came into conflict with President Johnson over the latter's reconstruction policy. Johnson's effort to remove the Secretary brought about his impeachment. When the President was acquitted Stanton resigned. He was appointed an Associate Justice of the Supreme Court by President Grant, but died a few days after the appointment was announced.

STANTON, ELIZABETH CADY (1815-1902), a woman suffragist and reform advocate, born in Johnstown, N. Y. She was educated in the local academy and by private teachers. Her father was an eminent lawyer and a member of Congress. The daughter inherited a legal mind and strong reasoning powers. She married Henry B. Stanton, a prominent Abolitionist and a man in full sympathy with her ideas. She met Lucretia Mott while attending the World's Anti-Slavery Convention in London, and thereafter the two labored together in the cause of woman's rights.



EDWIN M. STANTON



ELIZABETH CADY STANTON

In 1848 Mrs. Stanton called the first woman's rights convention ever held in America, to assemble at her home in Seneca Falls, N. Y. Three years later she became associated with Susan B. Anthony, and they worked jointly in the cause of woman's rights for the remainder of Mrs. Stanton's life.

Mrs. Stanton had a charming personal appearance, and was a good writer and a fluent speaker. She attained a national reputation as an author and lecturer and exerted a strong influence in behalf of the cause which she advocated. She held many prominent positions in women's organizations and was active in securing higher education for women. Some of her best-known writings are *The Solitude of Self*, *Self-Government the Best Means of Self-Development*, *Eighty Years and More*, an autobiography, and *A History of Woman Suffrage*.

STANTON, FRANK LEBBY (1857-), an American poet and journalist, born at Charleston, S. C. He had a common school education, was apprenticed to a printer and early entered the field of journalism. He was one of the first poet humorists to edit a column of witty comment and satiric criticism of current events. His column "News from Billville," in the *Atlanta Constitution*, brought him wide notice and popularity, and his negro dialect verse added to his fame. His poetry appeals by reason of its simplicity and optimistic tone. His books are *Songs of the Soil*, *Songs from Dixie*, *Up from Georgia* and *Little Folks down South*.

STARCH, a white, odorless, tasteless compound found in all plants except fungi. Chemically it is known as a carbohydrate, or compound of carbon, oxygen and hydrogen. It constitutes one of man's chief foods, and is an important heat and energy producer. The processes by which starch is produced in a plant are not known to the botanist or the chemist. It is sometimes stored in the leaves, but is more plentiful in thick roots, tubers and seeds. It abounds in arrowroot, potatoes and wheat.

Starch is a soft, white powder. Microscopic examination shows that it consists of tiny grains, varying in size and formation according to the plant, the grains of potato starch being among the largest, those of wheat and rice among the smallest. It will not dissolve in cold water, alcohol or ether; but if boiled in water it forms a paste.

Starch when subjected to dry heat changes to dextrin, and from this is derived, through fermentation, the substance known as dextrose, or grape sugar.

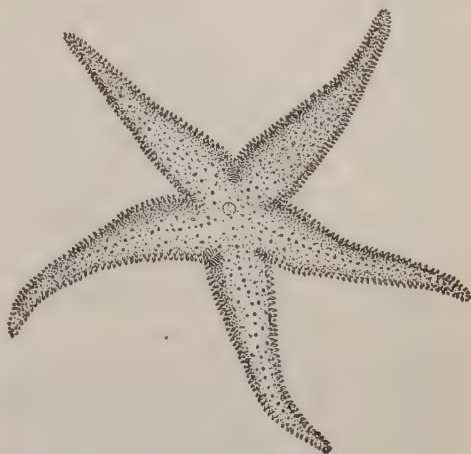
Starch is used for food and for various industrial purposes. Its chief use in industry is as a stiffening for clothes in the laundry. That used for industrial purposes is obtained from rice, potatoes, wheat and sago. Rice starch, which is preferred for laundry purposes, is prepared by steeping the grains in an alkaline solution. Potato starch is obtained by merely steeping the potatoes, mashing them to a pulp, and after they have remained for a time in a settling tank, drying with gentle heat. To separate the starch from wheat the grains are fermented, the gluten dissolves, and in the washing process which follows the gluten and starch are separated. In addition to its use in laundries, starch is employed in the manufacture of dextrin; it is also used as a thickener in calico printing and for numerous miscellaneous purposes.

The value of the starch annually manufactured in the United States is more than \$9,000,000. Most of it is made from Indian corn, which of all known plants contains the highest percentage of starch (77%). Rice contains 76% starch, wheat 54.75%, and potatoes 18.5%.

STAR CHAMBER, formerly an English court of civil and criminal jurisdiction at Westminster, said to have taken its name from the star-decorated room in which it was held. Originally a committee of the Privy Council, it was remodeled during the reign of Henry VII to include four high officers of state, with power to add to their number a bishop, a temporary lord of the council and two justices of the courts of Westminster. It had jurisdiction over forgery, perjury, riots, maintenance, fraud, libel and conspiracy cases, and it could inflict any punishment short of death. Its trials were without jury, and the abuses which this made possible led to the abolition of the court in the reign of Charles I. To-day any secret meeting to deliberate on public matters is called a *star-chamber session*.

STARFISH, an interesting sea animal shaped much like a five-pointed star, belonging to the group of marine animals known as *echinoderms*, meaning *spiny-skinned*. The fish consists of a central disk from which radiate five arms, and the entire body

is encased in a tough skin covered with tiny spines. In the center of the under surface of the disk is a mouth, and from this pass



STARFISH

five grooves, each leading to the tip of one of the points. There is a small eye at the tip of each arm. Double rows of tiny suction cups along these grooves serve for purposes of locomotion and for organs of smell. They also serve the animal in capturing its prey—oysters, mussels, snails and other mollusks. By these means the starfish can pull upon an oyster shell with such force that the valves break open. Its raids upon some of the oyster beds of the Atlantic coast cause an annual loss of many thousands of dollars.

STARK, JOHN (1728-1822), an American soldier, born at Londonderry, N. H. While still a young boy, he was captured by the Saint Francis Indians and adopted into the tribe. He fought in the last French and Indian war, and at the opening of the Revolution he raised a regiment, which he led to Cambridge, and took a prominent part in the Battle of Bunker Hill. He was present with Washington at the battles of Trenton and Princeton, but resigned his commission in April, 1777. At the approach of Burgoyne, however, in the fall of the same year, he raised a regiment of New Hampshire troops and completely routed a force of Tories and Hessians at Bennington, August 16. He was also present at the Battles of Saratoga and was made a brigadier-general in 1777. Stark was a member of the André court-martial and served at the head of important departments until the close of the war. He was one of those who, in 1776,

pledged their private fortunes to pay the soldiers, in order to induce them to enlist for a second term.

STARLING, a European bird related to the blackbird. It has a short tail, long and pointed wings and a sharp bill. The plumage the first year is brown; afterwards it is blackish, with a greenish luster, occasionally purplish. The shoulders are brown, and the wing coverts have light edges. The females are more soberly colored. Starling nests are placed in ruined walls or in the branches, and five pale blue eggs are laid. The birds feed upon insects, and are often found near domestic animals catching the insects that the latter attract.

Starlings have a variety of notes, and some species have clear whistles or rich songs. They thrive in captivity and improve in their songs. The common starling was introduced into the United States in 1890, and the birds are now numerous in the Eastern states.

STAR-NOSED MOLE, a North American genus of moles, distinguished by bearing at the extremity of the muzzle a remarkable structure of fleshy and somewhat cartilaginous rays, disposed in the form of a star.

STAR OF BETHLEHEM, a common spring garden plant of the lily family, with white, waxy and starlike flowers. It is a native of Europe, but it is naturalized in the United States.

STAR ROUTE, a route in the United States over which mail is transported in bulk by private contract after it leaves a railway train or a steamboat. Such routes are called star routes because they are marked in postal guides by asterisks. The mail may be carried in a wagon, on horseback, or by a messenger on foot. Mail routes by railroads, or steamboats and rural free delivery routes are not star routes.

Star Route Frauds, frauds disclosed in connection with the postal service during the administration of President Hayes. Through the activity of a certain clique of government officers, including several Senators and Representatives, the compensation for carrying the mails over these routes was increased more than fourfold, the profits being divided between the contractors who carried the mail and the members of the ring. The leaders were prosecuted during the early part of Garfield's administration, but only one was ever punished. However, the operations of the conspirators were ended.



STARS. "One sun by day, by night ten thousand shine," wrote the poet Young, in *Night Thoughts*, in reference to the stars. These heavenly bodies are suns like the one which warms and lights the earth, but they are so far away that they appear in the sky merely as twinkling spots of light. Because they seem

to remain immovable they are often called *fixed stars*, but the name is not appropriate, for it is now known that all are in motion. The movements of some have been ascertained by astronomers, but they are at such infinite distances from the earth that to the naked eye they do not appear to change their relative positions. In order to distinguish the stars from one another the ancients divided the heavens into spaces containing groups of stars called constellations, but modern astronomers have divided the heavens by imaginary circles which correspond to the circles measuring longitude and latitude on the earth.

Magnitudes of Stars. The stars are classified according to their brightness as of different magnitudes, those of the first magnitude being the brightest. All the stars beyond the sixth or seven magnitude are called *telescopic stars*, as they cannot be seen by the naked eye. Astronomers recognize stars as small as those of the sixteenth magnitude. As to the absolute size of the stars, little is known; but the light given out by Sirius, the brightest star in the heavens, is estimated at 63½ times that of the sun. Stars are very irregularly distributed over the heavens; in some regions scarcely one is to be seen, while in others they seem densely crowded together, especially in the portion known as the galaxy, or Milky Way. Of the stars visible to the naked eye at one time, the number probably does not exceed a few thousands, but seen through the telescope, their number is so great as to defy calculation.

Distances of the Stars. The distances of the stars from the earth are very great. The shortest distance yet found, that of *α Centauri*, a double star in the Southern Hemisphere, has been calculated at so great a distance that light takes 3½ years to travel from it to our earth and a flash of light will encircle the earth in less time than one can

wink. When we look at the stars, they appear to be placed on the inside of a hollow sphere that revolves around us, and the pivot on which the sphere turns is near the North, or Polar, Star. This apparent rising and setting of the stars is due to the rotation of the earth.

Variable Stars. Many stars have been observed whose light appears to undergo a regular periodic increase and diminution of brightness, amounting, in some instances, to a complete extinction and revival. These are called *variable* and *periodic* stars. It is found that some stars, formerly distinguished by their splendor, have entirely disappeared. Such stars are called *temporary*. Many of the stars that usually appear single are found, when observed with telescopes of high magnifying power, to be really composed of two, and some of them have three or more stars close together. The colors of the stars vary considerably, red, yellow, blue and green being noticeable, and it is supposed that they differ considerably in composition, though they are probably made up of the same matter that composes the earth.

Related Articles. For names of the stars treated in these volumes, see the list accompanying the article *Astronomy*. For further information, consult the following titles:

Constellations	Milky Way	Solar System
Double Stars	Planet	Sun

STAR-SPANGLED BANNER, the most popular patriotic hymn of the American people, and by common acceptance the one honored as their national anthem. The words were written by Francis Scott Key in 1814, during the War of 1812, under the following circumstances: After the burning of the national capital by the British, an American official was taken captive on board the British frigate *Surprise*, stationed in Chesapeake Bay. Francis Scott Key and a friend boarded the ship in an attempt to secure the release of the prisoner, and found the frigate being prepared to bombard Fort McHenry, a fortress near Baltimore, Md. Forced to remain on board until after the battle, the Americans watched the bombardment throughout the day (September 13) and the ensuing night, and when in the morning they saw, through a rift in the haze and smoke, the Stars and Stripes still waving over the fort, Key was inspired to write the words of his immortal song. The music is that of an old English tune called *Anacreon in Heaven*.

Below are the first, second and fourth stanzas of the anthem (the third being omitted):

Oh! say, can you see, by the dawn's early light,
What so proudly we hailed at the twilight's
last gleaming?

Whose broad stripes and bright stars, thro'
the perilous fight,
O'er the ramparts we watched were so gal-
lantly streaming?

And the rockets' red glare, the bombs bursting
in air,
Gave proof thro' the night that our flag was
still there.

Oh! say, does the star-spangled banner still
wave

O'er the land of the free and the home of the
brave?

On the shore, dimly seen thro' the mist of
the deep,

Where the foe's haughty host in dread
silence reposes,

What is that which the breeze, o'er the
towering steep,

As it fitfully blows, half conceals, half dis-
closes?

Now it catches the gleam of the morning's
first beam,

In full glory reflected, now shines on the
stream;

'Tis the star-spangled banner. Oh! long may
it wave

O'er the land of the free and the home of the
brave!

Oh! thus be it ever when freemen shall stand
Between their loved homes and the war's
desolation;

Blest with vict'ry and peace, may the
heav'n-rescued land

Praise the Pow'r that hath made and pre-
served us as a nation.

Then, conquer we must, when our cause it is
just,

And this be our motto, "In God is our trust."
And the star-spangled banner in triumph
shall wave

O'er the land of the free and the home of the
brave.

STARVATION, *stahr va'shun*. When food is not taken in sufficient quantities to supply the waste that is continually taking place in the various organs of the body, the tissues themselves are used to supply energy, and starvation follows. The accompanying conditions are emaciation, lowered vitality and temperature and a general weakness. Death in animals, according to Chossat, occurs when the body has lost two-fifths of its weight. Man seldom lives longer than a week or ten days when deprived of food, but he may live much longer if he lies quietly in bed and keeps warm. An Italian named Succì, and

an American, Dr. Tanner, each tried the experiment of fasting forty days without food but with a little water, and lived through the ordeal. Others have tried like experiments in the interests of medical science and have died from their effects.

STATE, an organization of people for political ends, permanently occupying a fixed territory, and possessing an organized government capable of making and enforcing law within the community. To be a sovereign state, such an organization cannot be subject to any external control. In the United States the term *state* is also applied to the political divisions which are united under the Federal government. As to its form of government a state may be an aristocracy, a monarchy or a democracy. Since the beginning of the twentieth century democracy has gained at the expense of other forms of government. This statement is entitled to still greater emphasis since the close of the World War, in 1918.

A study of the state is a study of the philosophy of politics from the time of the ancient Greeks to the present day, and even an outline of such a study would be impossible in a brief article. It is generally conceded, however, that the functions or purposes of the state are to develop the moral nature of its subjects; to preserve order; to further the general welfare, and to defend its people from external attacks.

Two theories of the state are strongly set forth by their respective followers. The first is that of the *paternalistic* or *socialistic* state, in which the government confines itself to the fundamental functions of preserving peace and punishing crime. There is a happy middle ground in which the state exercises those functions which have for their purpose the greatest good to the greatest number, and leaves to the individual citizen the freedom necessary to the enjoyment of life and the pursuit of happiness. See GOVERNMENT.

A State in the United States. When the pupil begins the study of the state as a unit in political geography he should have set before him the reasons for the division of the whole country into relatively small areas, each subdivided portion a state.

The thousands upon thousands of square miles of the national domain could not be governed properly from one point, no matter if it were centrally located. The national

capital was placed at the extreme eastern part of the country; except for inconvenience in traveling to it there can be no objection to its present location, in view of the divisions that have been made for purposes of local government. Were one capital city the source of all authority and were the American people governed exclusively from it, one might justly believe that sections near at hand would be well governed, and that within such area the interests of every person would be protected, while regions far distant would suffer for lack of properly exercised control.

When the pupil begins the study of civil government he will learn that for most purposes of government—for all purposes purely local—the state does not recognize the national government as a higher authority. In such matters as only concern the people in their relation to the state the authority of the state is supreme. The national government controls affairs within the state only so far as the welfare of all of the people of all of the states is concerned. The chart below shows the locations of many capital cities,



CAPITAL CITIES

Each star locates the seat of a nearly independent government.

each the absolute center of authority in all matters pertaining to the every-day needs of the people within that state. The controlling power is thus always near to all the people; that this necessary condition might prevail the state boundaries were located and state governments were organized.

It is well to study the geography of a state systematically and to cover every essential feature. Such a determination will lead older students to add to the merely geographical outlines something of government and history. In following the accompanying outline, such parts may be omitted for younger children as may seem justifiable:

Outline for Study of a State

- I. LOCATION
 - (a) Latitude
 - (b) Longitude
 - (c) Boundaries
 - (b) Navigable rivers
 - (c) Commercial centers
 - (1) Ten largest cities in order
 - (2) Population of each
 - (3) Distances from other great cities
 - (d) Principal manufactures
- II. EXTENT
 - (a) Length
 - (b) Breadth
 - (c) Area
 - (d) Compare in size with other states and countries
- III. OUTLINE
 - (a) General form
 - (b) Boundaries
 - (c) If there is coast line
 - (1) Length
 - (2) Indentations
 - (3) Projections
- IV. SURFACE
 - (a) General facts
 - (1) Mountains or great hills
 - (2) Plains
 - (3) Valleys
 - (4) Watersheds
 - (b) Effects on climate
- V. DRAINAGE
 - (a) River systems
 - (b) Lakes and springs
- VI. CLIMATE
 - (a) Natural condition expected, due to latitude
 - (b) Changes wrought by physical features
 - (c) Effect on health
 - (d) Average annual rainfall
- VII. PRODUCTS
 - (a) Agricultural
 - (1) Grains
 - (2) Stock raising
 - (3) Dairying
 - (4) Fruits, etc.
 - (5) Rank among states in production
 - (b) Mineral
 - (1) Precious metals
 - (2) Iron, coal, copper, etc.
 - (3) Oil and gas
 - (4) Sections where found
 - (5) Rank among states
- VIII. COMMERCE AND INDUSTRY
 - (a) Railways and canals
 - (a) State departments
 - (1) Executive
 - (2) Legislative
 - (3) Judicial
 - (4) How officers are chosen
 - (5) Length of terms
 - (b) Number of counties
 - (c) Number of members in Congress
 - (d) State institutions
 - (1) Penal
 - (2) Charitable
 - (3) Education of defectives
 - (4) How each is conducted
- IX. POPULATION
 - (a) Rate of increase
 - (b) Per cent of native Americans
 - (c) Countries furnishing foreign-born peoples
 - (d) Where densest, and why
- X. GOVERNMENT
 - (a) State departments
 - (1) Executive
 - (2) Legislative
 - (3) Judicial
 - (4) How officers are chosen
 - (5) Length of terms
 - (b) Number of counties
 - (c) Number of members in Congress
 - (d) State institutions
 - (1) Penal
 - (2) Charitable
 - (3) Education of defectives
 - (4) How each is conducted
- XI. EDUCATION
 - (a) Public school system
 - (1) Common schools
 - (2) High schools
 - (3) Normal schools
 - (4) Industrial education
 - (a) School of Mines
 - (b) Agricultural College
 - (5) State University
 - (b) Colleges
 - (c) Large private schools
- XII. HISTORY
 - (a) Exploration and settlement
 - (b) Date made a territory
 - (c) When admitted to Union
 - (d) Events that are historical
 - (e) Famous men and women
- XIII. STATISTICAL
 - (a) Rank among states in mineral products
 - (b) Rank in farm products
 - (c) Rank in area
 - (d) Rank in population

. STATE BANKS. See **BANKS**, subhead *State Banks*.

STATE, DEPARTMENT OF, one of the ten executive departments of the United States government, in charge of the Secretary of State, appointed by the President and confirmed by the Senate. This department was the first one organized under the Federal government. The Secretary is first in importance and prestige in the President's Cabinet and is first in line of succession to the Presidency. The department has charge of all foreign affairs, both of state and of the consular service, and its business is transacted through various bureaus and divisions. The duties of the Secretary of State follow:

The Secretary of State is charged, under the direction of the President, with the duties appertaining to correspondence with the public ministers and the consuls of the United States, and with the representatives of foreign powers accredited to the United States; and to negotiations of whatever character relating to the foreign affairs of the United States. He is also the medium of correspondence between the President and the governors of the several states of the United States; he has the custody of the Great Seal of the United States, and countersigns and affixes such seal to all executive proclamations, to various commissions and to warrants for the extradition of fugitives from justice. He is also the custodian of treaties made with foreign states, and of the laws of the United States. He grants and issues passports, and exequaturs to foreign consuls in the United States are issued through his office. He publishes the laws and resolutions of Congress, amendments to the Constitution, and proclamations declaring the admission of new states into the Union.

STATEN ISLAND, an island forming a portion of the southeastern part of New York State and the southern part of Greater New York, of which it constitutes the borough of Richmond. It is situated at the entrance of New York harbor, five miles southwest of Manhattan Island, and is separated from Long Island by the Narrows and from New Jersey by Staten Island Sound. It contains many fine residences. The island is thirteen miles long and has a hilly surface, the highest elevation being about 300 feet. The principal villages are New Brighton, New West Brighton, Port Richmond, Stapleton and Tompkinsville.

STATES-GENERAL, a French legislative body which existed from 1302 until the time of the French Revolution. It was made up of members of the clergy, the nobility and representatives of the common people, or Third Estate. These last were in the beginning elected by the king, but after 1484 all members were chosen by vote. The States-General met only when called by the king in times of emergency. From 1614 the body was not assembled until the famous meeting of 1789 (see **FRENCH REVOLUTION**).

The name States-General is also applied to the legislative assembly of Holland.

STATES OF THE CHURCH. See **PAPAL STATES**.

STATES' RIGHTS, a term employed in political science to denote the governmental rights of the individual states belonging to a Federal Union, it being understood that there are certain matters in which the states may act without interference from the central government. History proves that in a federation of independent states freedom of action is tolerated only so long as it does not interfere with the interests of the Union. The evolution of states' rights in the United States is a typical example. In the time of Hamilton it was a debatable issue; and Jefferson's contention that the right of each state to control its affairs was paramount to the central authority led logically to the doctrine of the right of secession. The Civil War removed all claims of state sovereignty.

STATICS, that branch of dynamics which treats of the properties and relations of forces in equilibrium, equilibrium meaning that the forces are in perfect balance, so that the body upon which they act is in a state of rest. The word *dynamics* is employed as expressing the science which treats of the laws of force or power, thus corresponding closely to the old use of the term *mechanics*; and this science is divided into *statics* and *kinetics*, the first being the science which treats of forces considered as producing rest and the second as treating of forces considered as producing motion. See **DYNAMICS**.

STATISTICS, a collection of facts; especially those facts which illustrate physical, social, moral, intellectual, political, industrial and economic conditions or changes of condition, and which admit of numerical statement and of arrangement in tables. The collection of statistics may have the object merely of ascertaining numbers or of learning what

happens in an average of a great number of cases, as is the case of insurance statistics; or of detecting the causes of phenomena that appear in the consideration of a great number of individual cases—such phenomena, for example, as the decline of a certain trade or the prevalence of a certain disease. In all civilized countries the collection of statistics forms an important part of government.

STATUARY HALL, a large room on the main floor of the Capitol at Washington, which since 1864 has been used as a memorial hall. Each state may place in it two statues of the men or women it wishes thus to honor. The hall, which is circular in shape and directly beneath the dome, was, until 1857, the chamber of the House of Representatives, and many are the important events in United States history that have taken place within its walls. Here Madison was inaugurated President in 1809 and 1813, and Monroe in 1821; here John Quincy Adams was elected President in 1825, and here Fillmore took the oath of office. Within these walls took place many important debates; the voices of Calhoun and Webster, of Lincoln and Douglas, were among those that directed events.

According to the Congressional act by which the room was created a memorial hall, the statue may be in bronze or marble and must be a portrait of a deceased person who was a citizen of the state and distinguished for civic or military service. Fifty illustrious citizens have been honored by representation in this hall. See table below:

STATUTE, the written enactment of the legislative branch of a government or of some duly authorized body acting in conformity with its will. The supreme legislative bodies are called respectively Congress, Parliament or some synonymous name. Smaller bodies, such as councils, and boards of aldermen, acting under the authority of the higher body, may pass ordinances dealing specifically with local administration—ordinances duly sanctioned by constitutional rule.

STAUNTON, VA., the county seat of Augusta County, 135 miles northwest of Richmond, on the Baltimore & Ohio and the Chesapeake & Ohio railroads. The city is surrounded by an agricultural region, and is the center of the apple production of the state. Its factories turn out organs, overalls, pennants, brick, flour, chemicals, wagons, agricultural implements and general machine shop products. The leading public buildings are the city hall, the courthouse, the Masonic Temple and the Columbian Hall. The state institutions for the insane, the deaf and dumb and the blind are located here, and the city has several seminaries for girls, a military academy and parish and other private schools. The place was settled in 1745 by people from northern Ireland and was chartered as a city in 1871. During the Civil War it was an important strategic point. Woodrow Wilson was born in Staunton in 1856. Population, 1920, 10,617.

STEAD, *sted*, WILLIAM THOMAS (1849-1912), an English editor, born at Embleton.

STATE	NAME	DATE	STATE	NAME	DATE
Alabama	J. L. M. Curry	1906	Missouri	Francis P. Blair	1899
Arkansas	James P. Clarke	1921	New Hampshire	John Stark	1894
"	Uriah M. Rose	1917	"	Daniel Webster	1894
Connecticut	Roger Sherman	1872	New Jersey	Philip Kearny	1875
"	Jonathan Trumbull	1872	"	Richard Stockton	1886
Florida	John Gorrie	1914	New York	George Clinton	1873
"	Kirby Smith	1918	"	Robert R. Livingston	1874
Idaho	George L. Shoup	1909	North Carolina	Zebulon B. Vance	1916
Illinois	James Shields	1893	Ohio	William Allen	1887
"	Frances E. Willard	1905	"	James A. Garfield	1885
Indiana	Oliver P. Morton	1899	Oklahoma	Sequoyah	1917
"	Lew Wallace	1909	Pennsylvania	Robert Fulton	1881
Iowa	James Harlan	1909	"	J. P. G. Muhlenberg	1881
"	S. J. Kirkwood	1913	Rhode Island	Nathanael Greene	1869
Kansas	Geo. W. Glick	1914	"	Roger Williams	1870
"	John J. Ingalls	1904	South Carolina	John C. Calhoun	1909
Maine	William King	1877	Texas	Stephen F. Austin	1904
Maryland	Charles Carroll	1901	"	Samuel Houston	1904
"	John Hanson	1901	Vermont	Ethan Allen	1875
Massachusetts	Samuel Adams	1873	"	Jacob Collamer	1879
"	John Winthrop	1872	Virginia	R. E. Lee	1908
Michigan	Lewis Cass	1889	"	George Washington	1908
"	Zachariah Chandler	1913	West Virginia	John E. Kenna	1901
Minnesota	Henry M. Rice	1916	"	Francis H. Pierpont	1903
Missouri	Thomas H. Benton	1899	Wisconsin	James Marquette	1895

After nine years' experience as editor of the *Darlington Northern Echo*, he became assistant editor of the *Pall Mall Gazette* under John Morley, and when the latter retired Stead became editor. He introduced the interview and many American methods into English journalism, and made a reputation for his originality. In 1890 he founded the monthly *Review of Reviews*, with branches in Australia and the United States, and was editor of it until his death. He vigorously opposed war, and his weekly paper, *War Against War*, did much to create a sentiment for universal peace. His opposition to the Boer War cost him the friendship of Cecil Rhodes. He wrote numerous books and magazine articles, including some on spiritualism, to which he became a convert. Whatever he undertook, his unbounded enthusiasm and enterprise gave him the strength of a crusader; he always fought for what he believed. He made several visits to America, and lost his life when the *Titanic* sank off the Grand Banks of Newfoundland. His books include *The Truth About Russia*, *A Study of Despising Democracy* and *If Christ Came to Chicago*.

STEAM. We usually think of steam as the vapor of water formed when it is at boiling point, that is, 100°C . or 212°F . However, steam forms at all temperatures, even below freezing point, for steam is the vapor of water, and is formed whenever evaporation (which see) takes place.

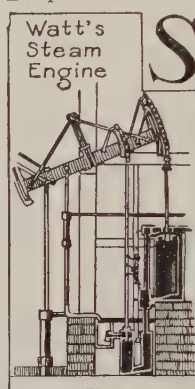
Steam is lighter than water, and at boiling point it occupies about seventeen hundred times as much space. Pure steam is invisible and should be distinguished from the clouds formed by the issuing of steam from the spout of a teakettle or the escape pipe of an engine, for these clouds are caused by the condensation of the steam into minute particles of water. The expansive force of steam increases with the increase of temperature. This is taken into consideration in the operating of engines. Dry steam is secured by heating steam to a temperature above that of boiling water. The dome of the boiler is a chamber for collecting the dry steam. *Wet steam*, or *saturated steam*, is of the temperature of boiling water and contains particles of water suspended in the vapor. *Waste*, or *exhaust steam*, is that which has been used; *live steam* is that ready for use.

The great expansive force of steam, and the ease with which it can be condensed, make it

the most valuable gas for the motive power of engines. Steam is also used for warming buildings, for cooking, in meat packing and for extracting substances such as glue from animal tissues.

Related Articles. For further information on this subject consult the following titles:

Boiling Point Steam Engine
Evaporation Turbine



STEAM ENGINE. Every boy and girl has probably read the story of James Watt, who sat by the fire and watched the steam as it lifted the lid of his mother's teakettle, and how from these observations he worked out a device to utilize the power of steam in operating machinery. We think of Watt as the inventor of the steam engine, because

he was the first to make it a practical machine, but several others before Watt's day had attempted to invent a steam engine, and in 1705 Thomas Newcomen of England was granted a patent for an engine that was used for some time for pumping water from coal mines.

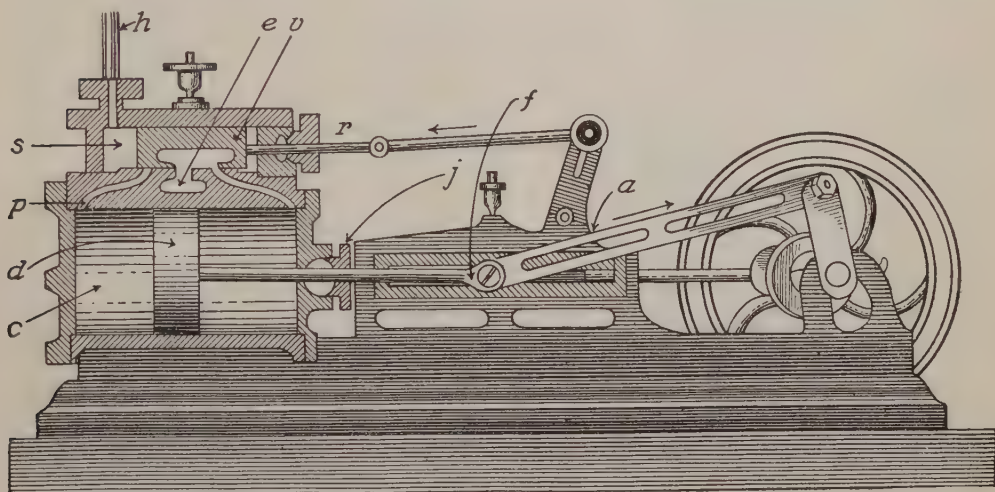
Newcomen's original engine was a clumsy device, consisting of a boiler, from which the steam was conveyed by a pipe to the interior of a cylinder, the upper end of which was open to the air, and in which the piston worked. The piston was attached to a walking beam, to the opposite end of which the pump rod was attached. Clumsy as this machine was, it worked fairly well for pumping water. The piston was raised by the pressure of steam and was forced down by the pressure of the air, after the steam in the cylinder had been condensed by the use of cold water. The valves were worked by hand until a boy who was tending the valves became tired of his task and by a system of sticks and cords so connected them with the walking beam that the engine became self-acting. Later his device was attached to all engines.

Watt's work consisted in improving Newcomen's engine. This he accomplished by constructing a cylinder that would admit steam at each end, and by attaching a valve to this cylinder so that the steam would enter one end of the cylinder as it escaped from

the other, as shown in the illustration. In Watt's engine the steam pushed the piston back, and the use of cold water for condensing the steam in the cylinder was unnecessary. Watt's improvement resulted in such a saving of fuel and increase of speed in the engine as to make it practical. He took out his first patent in 1769, and, because all steam engines constructed since have been upon Watt's plan, that is the year in which the steam engine is considered to have been invented.

Parts. The essential parts of a steam engine are the boiler; the working parts, consisting of cylinder, piston, valves and gear; the necessary appliances for connecting the piston with the machinery to be operated.

opens and closes the steam ports and the exhaust port. The diagram shows steam entering the cylinder through the left port and escaping to the exhaust port at the right. The piston is moving towards the right. When it reaches its farthest point in that direction, the valves are reversed, thus forcing the piston back to the opposite end of the cylinder. The outer end of the piston rod is connected with a *cross head*, to which the crank rod (*a*) is also attached. The cross head slides between guides and holds the piston rod firmly in position. The connecting rod joins the cross head to the crank and thus changes the reciprocating motion of the piston into the rotary motion of the shaft. The shaft contains the necessary attachments for operating



PARTS OF A STEAM ENGINE
Explanation appears in the text.

These usually consist of a connecting rod, a crank and a shaft, or fly wheel.

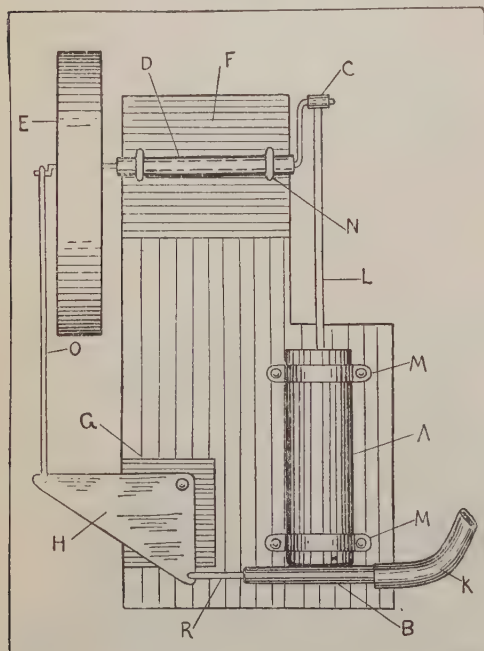
The cylinder is an iron box, whose inner surface has been carefully turned. Upon one side, a box called the *steam chest*, (*s*), is fastened, and from this openings, called *steam ports*, lead to each end of the cylinder (*c*). Steam is admitted through the pipe (*h*). Between the steam ports is the *exhaust port* (*e*). The *valve* (*v*) is connected by the eccentric rod (*r*) with the eccentric, which gives it its sliding motion. The cylinder contains the piston (*d*), to which is fastened the piston rod (*f*). As this leaves the cylinder it passes through the *stuffing box* (*j*), which is packed with cotton waste or other material, to make it steam-tight. The valve alternately

the valves and governor, so that the engine is automatic. All that is necessary to start the engine is to open the *throttle valve*, which admits the steam to the steam chest through the pipe (*h*). The movement is regulated by the governor.

Classification. Engines are classified according to the position of the cylinder axis, according to their method of using steam and according to the work for which the engine is designed. A vertical engine has the axis of the cylinder in a vertical position, and the piston has an up and down motion. A horizontal engine has the piston axis in a horizontal position. This is the most common pattern of stationary and locomotive engines. The use of electricity has led to the construction

of a pattern of large engine which combines the vertical and horizontal types, one cylinder being vertical and the other horizontal. Some of these engines have a capacity of 5,000 or 6,000 horse power.

According to their method of using steam, engines are *condensing*, or *low pressure*, and *non-condensing*, or *high pressure*. A condensing engine is one in which the exhaust steam is conducted to a condensing chamber, where



TOY STEAM ENGINE (Fig. 1)

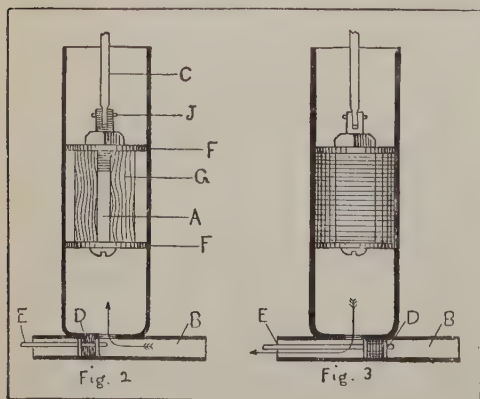


Fig. 2

Fig. 3

it is condensed, the water being returned to the boiler. This is called the low-pressure engine, because the air pump connected with the condensing chamber enables the exhaust

steam to escape into a vacuum. In the high pressure engine the exhaust steam escapes into the air, consequently it must overcome the pressure of air, which, at sea level, is equal to about fifteen pounds to the square inch.

The *compound* engine uses the steam successively in two or more cylinders before it is allowed to escape, while a *simple* engine uses the steam but once. Compound engines, known as *triple expansion* engines, are the most common form of marine engines. They are usually vertical and use the steam three times.

How to Make a Steam Engine. A toy or model engine can easily be made from material found in nearly every home. The cylinder A (Fig. 1) is an old bicycle pump, cut in half. The steam chest B is part of the piston tube of the same pump, the other parts of the tube being used for the bearing C and the bearing D. The fly-wheel E may be any small-sized iron wheel, such as an old sewing-machine wheel or pulley wheel. If the bore in the wheel is too large for the shaft, it may be bushed with a piece of hard wood: to bush the bore cut out a circular piece of wood to fit tightly into the opening; in this piece of wood then cut a circular hole just large enough to admit the shaft. The shaft may be made of heavy steel wire, the size of the hole in the bearing D.

The base should be of wood on which are fastened two blocks F and G, $\frac{3}{8}$ -inch thick, to support the bearing D and the valve crank H, which is made of tin. The hose K leads to the boiler. The clips M are soldered to the cylinder and nailed to the base, and the bearing D is fastened by staples.

The piston is harder to make, because it must fit closely into the cylinder and yet move freely. It may be made of a stove bolt A (Fig. 2), with two washers FF which just fit the cylinder. Around the bolt wind soft string to the width of the washers. Before winding it would be well to saturate the string with thick oil. A slot must be cut in the end of the bolt A to receive the connecting rod C. Solder or a pin as shown in the diagram may be used to hold the rod C in place. The valve D is made of an old bicycle spoke E, with the nut cut in half and the space between filled with string and oiled, just as was done with the stove bolt. Bore a hole in the bottom of the cylinder and another of equal size in the side of the piston

tube in which the valve D works. Then solder these pieces together so that the holes leave a free opening. The valve crank H (Fig. 1), already mentioned, may be cut from a sheet of heavy tin or galvanized iron, and is moved back and forth by a crank on the shaft. This crank must be at right angles to the main shaft.

The boiler may be an old oil, powder, or syrup can with a tube soldered to it. This tube should be connected to the engine by the rubber E of Fig 1. A good Bunsen burner or small gas stove will furnish enough steam to run the engine at high speed.

Now that we have set up the engine we may study the manner in which it works. The water in the boiler becomes steam when the heat underneath is sufficiently great.

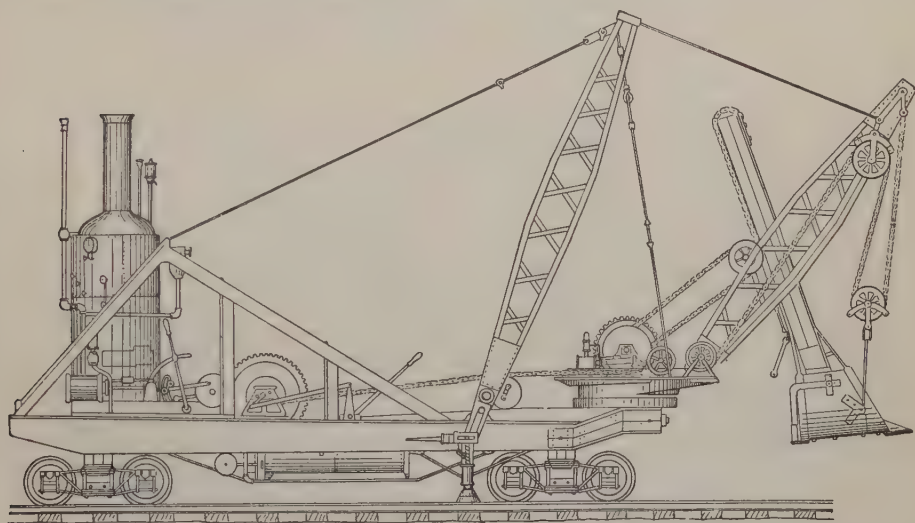
will continue. The operator should be careful that no steam escapes at the joints or connections. When the machine is in good running order it is possible to run a belt over the fly-wheel and let it perform a great variety of work for us.

Related Articles. Consult the following titles for additional information:

Boller	Locomotive
Eccentric	Traction Engine
Governor	Watt, James

STEAM HAMMER, a hammer operated by the action of steam, without the aid of any other machinery. This contrivance was invented by an Englishman, James Nasmyth, in 1839, and it immediately revolutionized the industries involving heavy forging.

The important parts of a steam hammer are frame, cylinder, piston, piston rod, ham-



STEAM SHOVEL

Through the tube K this steam is let into the cylinder when the valve D (Fig. 2) is at the left of the opening. The pressure of the steam forces the piston upwards, thus turning the crank C and the fly-wheel E. The turn of the fly-wheel works the valve crank H which in turn forces the valve D to the right. When the valve is to the right of the steam inlet the steam will rush out as shown by the arrow in Fig. 3. Now that the cylinder A is empty, the piston will return to the bottom, thus turning the fly-wheel again, changing the position of the small valve B (Fig. 2) so that more steam will enter the cylinder at A. As long as there is enough steam in the boiler this process

mer proper and the anvil. In the early pattern, known as the Nasmyth hammer, the hammer was operated by admitting the steam to the lower end of the cylinder and raising the piston. The steam was then cut off and the hammer fell by its own weight. Later improvements admit the steam alternately at the two ends of the cylinder, the same as in the steam engine, and operate much more rapidly and effectively. The hammer is so perfectly adjusted that it can be made to strike a blow of any required force. Steam hammers are used in large forgings, such as gun forgings, shafts for vessels and other like purposes. Electrically-operated hammers are now coming into more general use, and

can be made as powerful as any of the largest steam hammers.

STEAMSHIP. See SHIP.

STEAM SHOVEL, *shuv'el*, an excavating machine for use on land. The huge types used in the excavation of the Panama Canal handled from 4,000 to 5,000 cubic yards of rock or ore daily. These monster machines are also used extensively in digging and loading ore in iron mines of the Great Lakes region and for excavating canals and cuts on railways.

Method of Operation. The steam shovel including the engine, is mounted on a car, so that it can be moved as required. It consists of a hoisting engine and movable crane, with a scoop, or shovel, so attached to the crane that it can be moved in any direction. The bottom of the shovel is attached by a hinge and held in place by a spring. In use the shovel is lowered to the earth, then pulled forward and slightly downward by a chain that winds over a cylinder. This movement fills it. When filled, it is raised by the crane and swung over the point where it is to be emptied. By pulling a cord the spring holding the bottom in place is released, and the shovel empties itself. The capacity of steam shovels varies from one to five cubic yards, but from one and a half to two and a half cubic yards are the sizes generally used.

STEAM TURBINE. See TURBINE, subhead *Steam Turbine*.

STEARIC, *ste ar'ik*, **ACID**, a fatty compound contained in the more solid fats of animals such as mutton suet, and in the fat of cow's milk. It is odorless and tasteless, it crystallizes in pearly scales, and is soluble in alcohol and ether. With paraffin it is used for making candles.

STE'ARIN, the chief ingredient of suet and tallow, or the harder ingredient of animal fats, olein being the softer one. It is prepared for practical use from beef suet and cottonseed oil, and it yields an oil used in the manufacture of butterine. Stearin has a pearly luster and is soft to the touch, but not greasy. It is insoluble in water, but soluble in hot alcohol and ether. When treated with superheated steam, it is separated into stearic acid and glycerine, and when boiled with alkalis the stearic acid combines with the alkali and forms soap and glycerine. When melted, stearin resembles wax.

STE'ATITE. See SOAPSTONE.

STED'MAN, EDMUND CLARENCE (1833-1908), a prominent American poet and critic, born at Hartford, Conn. He studied at Yale, took up journalism and was war correspondent of the *New York World* during the Civil War. Later he became a stockbroker in New York and was a member of the Stock Exchange. He contributed to the more important magazines and published his first volume of verse in 1860. His critical work, *Victorian Poets*, appeared in 1875 and has gone through many editions; the *Poets of America* appeared in 1886. Among his volumes of verse are *Poems, Lyrical and Idyllic; Hawthorne and Other Poems; Alice of Monmouth*, and *A Diamond Wedding*.

STEEL, the refined metal that gives strength and stability to the industries of the world, as gold determines the standard of value. It is a variety of iron containing less carbon than cast iron and more than wrought iron. Steel is stronger than iron, can be tempered to any degree of hardness, bent into any desirable shape, and cast in molds. It is the world's most valuable metal and enters into the manufacture of so many things upon which we depend for our commerce and comfort that were its supply suddenly to cease, the industries of the world would have to be reorganized.

In the article IRON the various iron ores are named and the methods of their production and transportation are described. This article treats of the reduction of these ores, their transformation into steel and the uses made of this valuable commodity.

Smelting the Ore. The iron and steel of commerce contain small quantities of carbon, manganese, phosphorus and sulphur, and the ores contain these substances in a much larger proportion, together with sand and other minerals, all of which must be separated from the metal. This is done through the process of smelting, which is carried on in a blast furnace.

The Blast Furnace. The blast furnace is so named because a blast of hot air is employed in producing the high temperature (600° to 900° F.) required in reducing the ore. A blast furnace is usually a tall cylindrical structure, and consists of the following parts: The stack, A; the boshes, B, which are the conical part below the stack; the hearth, H, the charging hopper, C, and the tuyeres, I.



1



2



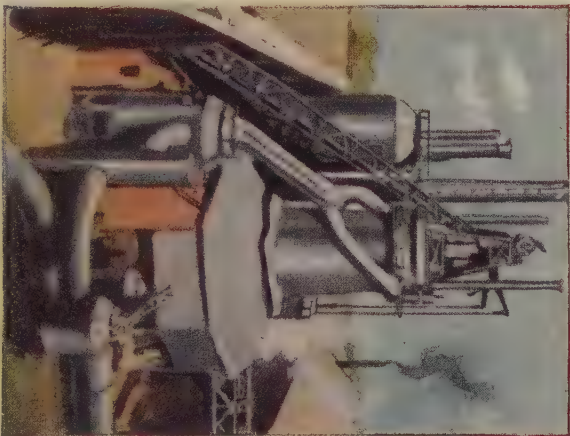
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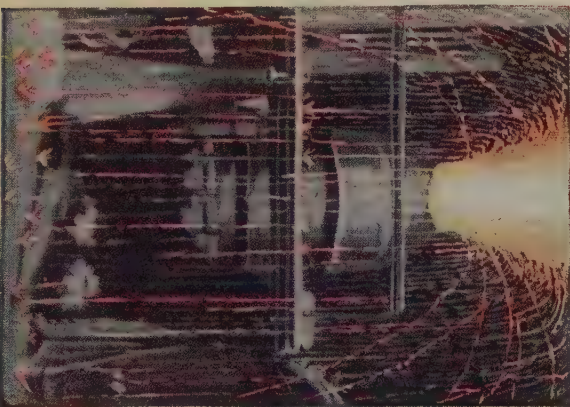
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6

IRON AND STEEL

1. Iron Mine.

2. Steam Shovel.

3. Ore Train.

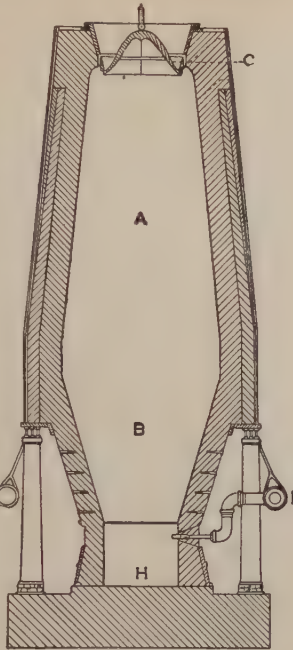
4. Steamer loading with ore.

5. Furnace.

6. Bessemer Converter.

7. Ingots.

The exterior consists of massive masonry of stone, brick or cement, the body part being lined with two shells of fire bricks, separated by a thin space to allow for expansion. This space is generally filled with sand, ground fire-clay or the like, to hinder the radiation of heat to the outside. When the body rises in the form of a perpendicular cylinder, it is called the barrel. The cone or barrel is sometimes elapselaped round on the outside by numerous strong iron hoops, or is cased with iron plates fastened to the masonry by iron bolts. The boshes are lined with firebrick or firestone, and the hearth is built with large blocks of stone which will resist the heat. A gallery is built around the top, and to this, material for charging the furnace is hoisted by an elevator. The top is closed by a bell-and-cone arrangement which is opened and shut at pleasure by hydraulic or other machinery. The height of furnaces varies from fifty to eighty feet, and in some cases to upward of one hundred feet, and the greatest width is in most instances not more than one-third of the height.



BLAST FURNACE

Near the furnace are tall cylindrical structures, usually four in number, called *stoves*. Their interior is filled with a checkerwork of brick, which is heated to a high temperature by burning the gas generated in smelting the ore. When this checkerwork in one stove is heated to its highest temperature, the heat is turned to another and the blast of air is forced through the hot stove before it is driven into the furnace. By this means the temperature required to smelt the ore is maintained with the smallest possible consumption of fuel.

The Charge. A charge for the furnace consists of crushed ore, crushed coke and crushed limestone, mixed in such proportions as to secure the largest amount of metal from the ore at the lowest temperature that will gain this result. The limestone acts as a flux, combining with the sand and other minerals and setting the iron free. The charging of the furnace continues at frequent intervals day and night, for when a blast furnace is started it continues in operation until repairs are necessary. The charges are constantly passing downward and undergoing a change as they come nearer the hotter parts of the furnace. Toward the lower part the earthy matter of the ore unites with the limestone and forms a slag, which finally escapes at an opening below the tuyeres, and the molten metal drops down and fills the lower part, to be drawn off at stated periods. This is done usually twice in twenty-four hours, by means of a round hole called a tap. The furnace is constantly kept filled to within about two feet of the top. (See illustration 5 in the color plate.) The molten metal may be run into channels in sand and cast into bars, forming *pig iron* or *pig*; or it may be poured into a ladle and taken to another furnace, for changing the iron to steel before it cools. *Wrought iron* is made by remelting and purifying pig iron. It is soft, tough and flexible. Pig iron contains too much carbon, and wrought iron contains too little, to form steel.

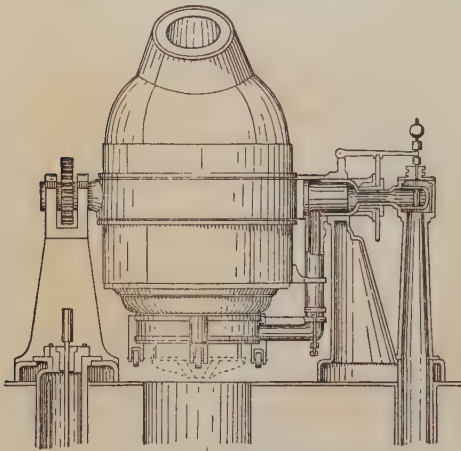
Varieties of Steel. There are a number of varieties of steel, each named from the method employed in its manufacture.

Crucible Steel. This variety is made by the oldest process by which steel is manufactured from iron. Wrought iron bars are laid between layers of charcoal in iron retorts that are lined with fire brick. The air is excluded, and the retorts are placed in a furnace and heated to a yellow heat, the temperature being maintained six or eight days, according to the grade of steel desired. The process is known as *cementation*, and from the appearance of the bars, which, when taken from the retorts, are covered with blisters, this is sometimes called *blister steel*. A small quantity of carbon is added to the wrought iron during the process, thus converting it into steel. With the best quality of wrought iron, this process produces the highest grade of steel. Since the outside of the bars absorb more carbon than the interior, the bars are

usually melted in a crucible and cast in molds or ingots which are of uniform quality. These ingots form the *cast steel* of commerce, from which steel tools and implements of the highest grade are made.

The *electric furnace*, in which the heat is produced by electricity, is now rapidly supplanting the crucible process in making high-grade steel.

Bessemer Steel. This variety of steel takes its name from Sir Henry Bessemer of England, the inventor of the process of its manufacture. In principle it is directly the reverse of the cementation process, which produces steel by burning the carbon into



BESSEMER CONVERTER

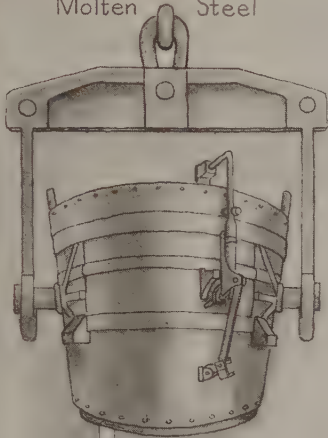
wrought iron. Bessemer conceived the idea of making steel by burning carbon out of cast iron, which contains too large a proportion. The furnace in which this is done is known as the *converter*. It is an egg-shaped iron vessel, about fifteen feet high and eight feet in diameter, narrowing at the top to an opening about eighteen inches in diameter. The furnace is lined with fire brick and mounted on trunnions, so it can be tilted to a horizontal position by a hydraulic piston. In most patterns the top is curved, so as to bring the opening to one side. The bottom contains a number of tuyeres, each perforated with holes half an inch in diameter. The tuyeres are connected with an air chamber, which is supplied with air through one of the trunnions, connected by pipes with a powerful blowing machine. The converter is charged directly from the blast furnace or from iron that is melted in a separate furnace, called the *cupola*. In being charged,

the converter is tipped upon its side. As it resumes an upright position, the blast is automatically turned on, and air is forced through the molten metal with a pressure varying from fifteen to twenty-five pounds to the square inch. This burns out the silicon and carbon and produces such violent boiling of the metal as to cause the converter and its foundations to vibrate perceptibly. When the silicon and carbon have been consumed, the blast is shut off, the converter is again tilted upon its side and a small quantity of *spiegeleisen*, an alloy of highly carbonized iron and manganese, is added. After this has been thoroughly mixed with the metal, the charge is poured into ladles, from which it is run into casting molds. The process of converting the charge into steel requires from eight to twenty minutes, and the time is determined by the furnace man, who is able to tell by the color of the flame at the mouth of the converter when the process is completed. As soon as the ingots have cooled enough to retain their form, the mold is taken off and the ingot is moved to the *soaking-pot*, which is another furnace heated by gas. Here the ingots remain until they acquire a uniform temperature and solidity, when they are ready for the *rolling-mill*. (See illustrations 6 and 7 in the color plate.)

Open-Hearth Steel. Open-hearth steel is that made in a furnace constructed on the same plan as that used in making wrought iron. The open-hearth furnace is charged with molten pig iron, scrap steel, iron ore and a small quantity of limestone or fluor-spar. The heat is produced by gas which burns over the charge. The process requires from six to twelve hours. The steel is poured into molds, then treated the same as that produced by the Bessemer process. The chief advantages of the open-hearth process are the opportunity of using scraps and the large quantity of metal that can be treated at one time, from seventy to a hundred tons of steel being made at a heat in the largest furnaces. About three-fourths of the steel produced in the United States is made by the open-hearth process.

Alloys of Steel. A number of other metals when united with steel in small proportions greatly improve its quality for specific purposes. A small quantity of nickel hardens the metal, and *nickel steel* is used in making armor plate for warships, and for steel used in large bridges. *Vanadium steel*

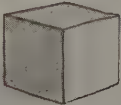
Open Hearth Process
Ladle Containing 100 Tons
Molten Steel



Steel Rails
Locomotive
Reaper
Printing Press
Loom
Telescope
Bridge
Office Building
Cannon
Tools
Ships
Watch Springs
Needles
Pens



Mould



One ton of Steel
(in Ingots)
worth \$40.00
can be

rolled out into
16,000 miles
watch hairsprings
worth
\$124,000,000.00



Open hearth furnaces and huge "ladle" for taking the molten steel to the moulds. The great nations are those that have a large store of iron and use it. Present civilization depends upon steel.



In the rolling mill. Note the path for hot rails from one set of rolls to another. When steel is heated it is rather soft, and may be hammered into any shape, planed, sawed, punched or tied in a knot.

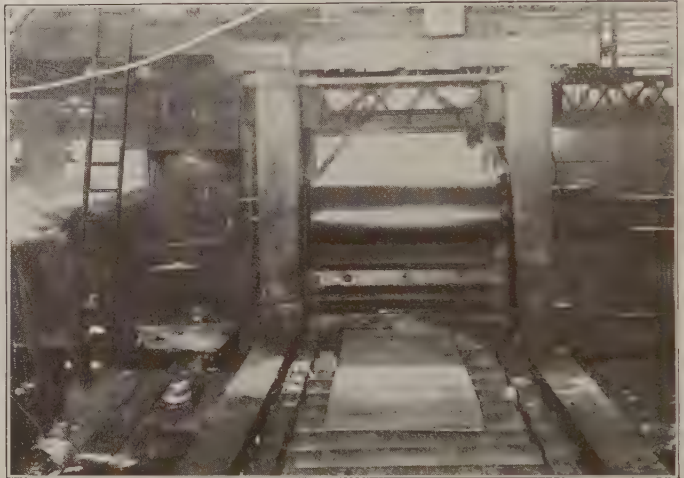


A bar of white hot steel passing through the shearing machine. As easily as you cut a cheese this machine clips off sections of steel six inches thick.



A drop hammer making a steel forging. Piston rods for engines, propeller shafts for an ocean liner, reinforcing columns for a lighthouse, all have undergone this process. For steel and men alike, the blows of life produce strength to withstand the storms.

This steel plate has just come through the rolls. The armor of a battleship, parts of machines, the framework of a great bridge, as well as the needle that sews up a boy's torn clothes, all start as a steel ingot and are rolled down and wrought into their final form.



What boy has not enjoyed making pins or iron filings jump to a magnet! He would open his eyes with wonder to see this great magnet pick up a rail, a bar, or a slab of steel, and carry it wherever desired, as easily as we carry an umbrella — and with much less danger of losing it. Won't some genius invent a magnet to prevent a man's forgetting his umbrella or to mail his wife's letters!

is extensively used in making automobiles, because of its power to resist shocks; *tungsten steel* is used in the manufacture of tools. The addition of from seven to fifteen per cent of manganese makes the metal very tough and hard, and *manganese steel* is used for rock crushers and other machines where great strength is required. Most of the railroad rails are of manganese steel.

Uses of Steel. The uses of steel are so numerous that only a few can be given in this article. Steel has replaced iron in almost everything in the line of construction. The frame of the city skyscraper is steel. We have steel ships, steel locomotives and cars that move on steel rails. Nails are made of steel wire, and our linen is sewed with the finest steel needles. The place of steel in the World War is aptly summarized in the following words:

In the great World War nations opposed each other in terms of steel. The tiny needle of steel carried on the endless work of small sewing; the instrument of steel served the surgeon; vessels of steel transported troops and provisions and policed the sea; the steel helmet protected the man in the trenches; and the shrieking steel shell carried destruction to the enemy. It has been a War of Steel. And, in the work of reconstructing the affairs of man, steel will play a ruling part. Where steel has destroyed, steel will renew. Steel will extend our roads of transportation and form vast bridges. Steel will plow the shell-torn fields and reopen the soil for seed. Steel will support the construction of new buildings and will supply machines and instruments for renewed manufacturing activities. Steel will deliver and protect the necessary supplies of man.

Production. The United States is the leading country of the world in the production of iron and steel (see IRON). Before the outbreak of the World War the other countries in order of their importance were Germany, the United Kingdom, France and Russia. The output of crude steel in the United States in 1919 had reached a potential total of 49,000,000 tons a year.

STEEL YARD, in mechanics, a balance, or weighing machine, consisting of a lever of unequal arms. The most common kind, often called the Roman balance, is a lever of the first class (see LEVER). One may find the weight of an object by suspending it from the end of the shorter arm, or placing it in a scale-dish suspended from that arm, and sliding a balance weight, whose weight is known, along the longer arm, until the in-

strument remains in equilibrium in a horizontal position; the weight of the substance attached to the short arm of the lever is ascertained by observing the position of the movable balance-weight, with respect to a graduated scale marked upon the long arm of the steelyard. A ring or hook is attached to the fulcrum, so that the instrument may be conveniently hung upon a fixed support.

STEEN, *stayn*, JAN (1626-1679), a celebrated Dutch painter, born at Leyden. Few facts of his life are known. One of these is that he worked at Haarlem from 1661 to 1669, the most productive period of his career. His works, which number about 500, are remarkable for draughtsmanship, clear, transparent color and keen humor. Steen delighted especially in scenes of Dutch life, and he ranks with Hogarth as a master of pictorial satire. No other Dutch painter save Rembrandt surpasses him in variety of subject, accuracy of treatment and in dramatic gifts. Fine examples of his work are *Eve of Saint Nicholas*, *The Rustic Wedding* (both at Amsterdam), *The Menagerie* (The Hague) and *The Music Master* (London National Gallery). Representative canvases are owned by the Metropolitan Museum, New York.

STEFANSSON, *sta'fahns sohn*, VILH-JALMUR (1879-), a Scandinavian explorer, who, as head of an expedition, discovered in 1915 a hitherto unknown island in the Arctic Ocean. The expedition was under the auspices of the American Museum of Natural History and the National Geographic Society (U. S.), and was financed by the Canadian government. Stefansson sailed from Victoria, B. C., in June, 1913; and the following spring, although the largest of his ships had been lost, he proceeded northeastward from Alaska. A feature of his trip was a three months' journey by sledge across floating ice. In February, 1915, he left Cape Kelleth, Banks Land, and proceeding north discovered, on June 18, near the 78th parallel, a mountainous island about a hundred miles long. He made subsequent surveys of importance in Arctic regions. See NORTH POLAR EXPLORATION.

STEFFENS, LINCOLN (1866-), an American writer and lecturer. He was born in San Francisco, was graduated from the University of California and later studied at Berlin, Heidelberg, Leipzig and Paris. He served as reporter and editor on New York papers and afterwards became editor succes-

sively of *McClure's Magazine*, *The American Magazine* and *Everybody's Magazine*. Many of his writings are in book form.

STEINBOCK, *stine'bok*, or **STEEN'BOK**, a small antelope, found in South Africa where its rocky habitat suggested the Dutch name, meaning *stonebuck*. It is ashen-gray on the sides, white underneath and stands about two feet in height; the male has short horns. The name is also applied in Europe to the ibex.

STEINMETZ, CHARLES PROTEUS (1865-1923), one of the greatest electrical experts of America. He was referred to as "the hunchback who played with thunderbolts". Born in Breslau, Germany, he was educated there, and at Berlin, and at Zurich, Switzerland. As a young man he came to America and in 1893 joined the engineering department of the General Electric Company in Schenectady, where he remained until he died. He not only made valuable contributions to the advance of electrical science, but he was also a philosophical writer who could make scientific subject plain to the lay reader. He was honored by colleges and many learned societies.

STEMS, the parts of plants which support leaves. Though stems in some plants are all underground, in most cases they serve to keep the leaves and flowers of plants in the sunlight; they always form channels by which the liquids in circulation can reach the leaves from the roots. The stems of some plants live but one year; others live two years, and still others may live on indefinitely from year to year. The methods of growth vary with the species, sometimes being directly upward from a terminal bud, making a cylindrical, upright tube; sometimes branching regularly, but still standing upright. Other stems are weak and rise by climbing only, either by their rootlets, or tendrils, or by twining round and round some slender support. The tuber of the potato or the root-stock of Solomon's seal are examples of underground stems. Other condensed forms are found above ground, as may be seen in the peculiar tips that the cactus family exhibits. See BOTANY; LEAVES.

STENCIL, *sten'sil*, a thin sheet of metal, cardboard, or other material with letters or designs cut in it. Stencils are much used in marking shipping boxes, in cases where the same marking is repeatedly used. The stencil is laid flat on the box and is painted

over with a brush saturated with ink. The ink touches the box only through the stencil openings. Stencils are sometimes used in transferring designs to walls.

STENOGRAPHY. See SHORTHAND.

STEPHEN, *ste'ven*, (about 1097-1154), king of England, son of Stephen, count of Blois, and Adela, a daughter of William the Conqueror. His uncle, Henry I, gave him the earldom of Montaigne, in Normandy, and large estates in England, in return for which he took the oath to secure the succession to Henry's daughter, Matilda. But when his uncle died, in 1135, he hastened from France to England, laid claim to the crown for himself and was crowned in London. In 1139 Matilda landed in England with her half-brother, the earl of Gloucester, and a civil war ensued, in which Stephen was taken prisoner and Matilda was acknowledged queen. The conduct of the new sovereign, however, excited an insurrection against her government, and she was shut up in Winchester Castle, while the earl of Gloucester was taken prisoner. Stephen was exchanged for the earl, and the war was renewed. When Matilda retired to Normandy, the contest was taken up by her son Henry. Finally the struggle was brought to an end in 1153 by the Treaty of Wallingford, in which it was agreed that Stephen should reign until his death, and that he should be succeeded by Henry.

STEPHENS, ALEXANDER HAMILTON (1812-1883), an American statesman, born near Crawfordsville, Ga. He spent his childhood amid the greatest poverty, received his education at Franklin College, through the assistance of a charitable organization, and in 1834 was admitted to the bar. He later repaid his helpers with interest.

Stephens was elected to the Georgia legislature in 1836 and to Congress in 1843, where he at once assumed prominence as a fearless advocate of the rights of the South, though at the same time a lover of the Union. In 1860 he opposed secession, not because he believed it wrong in principle, but because he deemed it inexpedient at the time. At the Georgia session convention he delivered a great speech for the Union, but when Georgia seceded he remained loyal to the state and became Vice-President of the Confederacy. He headed the Confederate peace commission at Hampton Roads, in February, 1865. At the close of the war he was im-

prisoned five months at Fort Warren, in Boston Harbor. In 1866 he was elected to the United States Senate, but was not allowed to take his seat. He entered Congress, however, in 1873, and remained there until 1882, when he was chosen governor of his state. In every position in which he was placed Stephens acted with the highest of motives and with deep conviction. His career constantly exemplified rare moral courage and devotion to principle.

STEPHENSON, *ste'ven son*, GEORGE (1781-1848), an English engineer and inventor, who built the first railway locomotive. While an engine-wright at Killingworth, he constructed a locomotive for the tramways and succeeded in inducing the projectors of the Stockton & Darlington railway to adopt it. The result was that in 1825 the first railway was built, over which passengers and freight were borne by locomotives. Stephenson was then employed to construct the Liverpool & Manchester railway, the directors of which accepted his locomotive, called the *Rocket*, which at the trial trip in 1830 ran twenty-nine miles in an hour, a high rate of speed in that day. Stephenson was afterward identified with numerous railway undertakings throughout England, and he invented a miner's safety lamp. See **LOCOMOTIVE**.



GEORGE
STEPHENSON

STEPHENSON, ROBERT (1803-1859), an English engineer, born at Wallington Quay, England, the son of George Stephenson. He received an excellent technical education and began his active career as his father's assistant in railroad surveying. He then took charge of his father's factory at Newcastle and greatly aided him in improving the locomotive. His services as a railway civil engineer were in great demand, and in time he became celebrated as the builder of great bridges. He was the inventor of the tubular bridge; the most celebrated of these bridges are the Britannia Bridge over the Menai Straits, the Conway Bridge and the first Victoria Bridge across the Saint Lawrence at Montreal. This last was replaced by a steel

truss bridge in 1898. See **BRIDGE**, subhead *Tubular Bridges*.

STEPPE, *steps*, the vast treeless plains extending from the River Dnieper eastward across Southern Russia and embracing Southwestern Siberia. During most of the year they are dry and barren, but after the spring rains they are for a short time covered with verdure and furnish pasturage for the flocks and herds of wandering Tartar tribes. See **PLAINS**.

STEREOPTICON. See **MAGIC LANTERN**.

STEREOSCOPE, an optical apparatus which enables one to look at the same time upon two photographic pictures, nearly the same, but taken under a slight difference of angular view, so that each eye looks upon one picture only. The effect is similar to that produced by natural vision. The two lenses are mounted in a frame having a handle and a bar extending outward. To this bar is attached a rack for holding the card on which the duplicate photographs are printed. A reflecting form of stereoscope was invented by Wheatstone in 1838. Subsequently Brewster invented the refracting stereoscope, based on the refractive properties of the halves of double-convex lenses. This is the one which was so popular a few years ago.

STEREOTYPING, *ster'e o type ing*, the process of impressing pages of type or of engraving in type metal and of making stereotype plate.

The type is set and locked in the form, then sent to the foundry, where the face is brushed clean with a soft brush dipped in oil. A thick, soft paper, especially prepared for the purpose, is then pressed down upon the type with a heavy iron roller. The face of the type is forced into the paper, so as to make a perfect mold of the page; this mold is called a *matrix*. After drying, the matrix is taken from the type and placed in a casting box. Melted type metal is then poured over it, making a plate which is a perfect copy of the type. The stereotype plates made for ordinary printing presses are flat. Those made for the presses used in large newspaper establishments are in the form of half-cylinders.

Several casts can be made from the same matrix. In all large cities there are firms which specialize in supplying country papers with plates for printing a portion of their paper. The time consumed in making a stereotype plate is about ten minutes. Since such

plates are inexpensive and are quickly made, they are especially valuable for printing daily papers and cheap editions of books. For higher grade of work the electrotype has displaced the stereotype.

Related Articles. Consult the following titles for additional information:

Electrotyping
Newspaper

Printing
Printing Press

STERNE, *sturn*, LAURENCE (1713-1768), an English author who made distinct contributions to the development of the English novel. After his graduation from Cambridge in 1736 he was ordained and went at once to a pastorate in Yorkshire. There he remained twenty years, devoting himself to reading and writing in his leisure moments. In 1759 appeared the first two volumes of his longest work, *Tristram Shandy*, which, by their humor, whimsicality and happy audacity of tone and treatment, gained instant popularity. The publication of this work was continued, the ninth and last volume appearing in 1767, and Sterne found himself exceedingly popular in London, whither he had moved. His other writings are *A Sentimental Journey Through France and Italy* (1768) and a number of sermons, besides letters published after his death. Though disfigured in places by the sort of vulgarity which was characteristic of the age, Sterne's *Tristram Shandy* and *Sentimental Journey*, especially the former, contain some of the finest humor in English literature.

STETHOSCOPE, an instrument by means of which the sounds of the heart and lungs are distinctly heard and the condition of these organs is ascertained. The most improved apparatus consists of a tube, one end of which flares like a bell; the other is attached to a forked tube with two earpieces. The bell is held against the chest or over the heart of the patient, while the physician listens with the aid of the earpieces.

STETTIN, *stet teen'*, the capital of the Prussian province of Pomerania, situated on both sides of the Oder and about eighty miles northeast of Berlin. It is one of the principal ports of Germany and its ship-building yards are among the largest in the world. It is the most important manufacturing center in the province. The chief mill products are chemicals, machinery, clothing and sugar. The trade is principally in fish, petroleum, corn, wood and wine. Among the objects of interest are the Municipal Museum, the town hall, the former

Ducal Palace and the churches of Saint Peter and Saint James. Population, 1919, 232,726.

STEUBEN, *stu'ben* or *stoi'ben*, FRIEDRICH WILHELM AUGUST, Baron von (1730-1794), a Prussian general, who fought in the American Revolution. He was born in the fortress at Magdeburg and at the age of fourteen entered the Prussian army. In 1758 he was made adjutant-general, and he fought with distinction during the Seven Years' War, becoming at its close grand marshal to the prince of Hohenzollern-Hechingen. In 1777, at the solicitation of Benjamin Franklin, he went to America and offered his services to Congress. He immediately was dispatched to Valley Forge, where, during the winter, he drilled the army in military tactics, in which he had received special instruction from Frederick the Great. He was made inspector-general and instituted many important reforms. He fought at the Battle of Monmouth, was a member of the André court martial, put an end to the marauding invasions of Benedict Arnold in Virginia and took a prominent part in the siege of Yorktown. At the close of the war he was granted large tracts of land by several states and a pension of \$2,400 by Congress; and he spent the remainder of his life in America.

STEBENVILLE, *stu'ben vil*, OHIO, the county seat of Jefferson County, forty-three miles southwest of Pittsburgh, Pa., on the Ohio River and on the Pennsylvania, the Pittsburgh, Cincinnati, Chicago & Saint Louis and the Wheeling & Lake Erie railroads. The city is in a section having deposits of coal, gas and petroleum, and it has extensive manufactures of iron, steel, paper, electric light bulbs, glass and pottery. Some important features are a city hall, a courthouse, a Carnegie Library, Gill Hospital, a Y. M. C. A. building and Stanton and Altamont parks. The town was laid out in 1798, on the site of a fort named in honor of Baron Steuben. It was chartered as a city in 1851. Population, 1910, 22,391; in 1920, 28,508, a gain of 27 per cent.

STEVENS, THADDEUS (1792-1868), an American statesman, born at Danville, Vt. He graduated at Dartmouth College, taught school and was admitted to the bar, practicing at Gettysburg and Lancaster, Pa. He was elected to the legislature as a Whig in 1833, where he served with rare energy and ability, and was elected to Congress in 1849.

There he was a leader of the anti-slavery forces for two terms and again in 1859. As one of the Republican leaders in Congress he was the chief advocate of emancipation and negro suffrage and of the radical reconstruction measures, and he led the impeachment of President Johnson. Though bitter and sarcastic in debate, he was famous for his indiscriminating charities.

STEVENSON, ADLAI EWING (1835-1914), an American statesman, Vice-President of the United States from 1893 to 1897. He was born in Christian County, Ky., and was educated in the common schools there and at Center College, Danville, Ky. In 1852 his parents moved to Illinois, where he was admitted to the bar five years later. In 1874 he was elected a member of Congress from Illinois by the Democratic party, and in 1885 was appointed first assistant Postmaster-General. At the conclusion of his term as Vice-President he was appointed a member of the commission to try to secure international bimetalism. He was nominated for Vice-President in 1900, on the ticket with Bryan, but was defeated.

STEVENSON, ROBERT (1772-1850), a Scotch engineer, born at Glasgow. His first work of importance was the erection of a lighthouse on Little Cumbræ. He was for forty-seven years inspector of lighthouses, and during that time he built twenty-three lighthouses on the Scottish coast, the most colossal of these undertakings being the construction of the lighthouse on the submarine Bell Rock. Stevenson introduced many improvements in the construction of bridges, canals, harbors and railways and invented the system of *intermittent* and *flashing* lights. See **LIGHTHOUSE**.

STEVENSON, ROBERT LOUIS BALFOUR (1850-1894), a Scottish poet, essayist and writer of fiction, born in Edinburgh. He studied law and was admitted to the Scottish bar, but found his true calling in literature. A leisurely journey through France and Belgium by canoe supplied material for *An Inland Voyage* (1878), and a walking tour in southern France was described in the following year in *Travels with a Donkey*. At this time were published, too, in various periodicals, the stories and essays, some of them among his best, which were afterward collected as the *New Arabian Nights*, *Virginibus Puerisque* and *Familiar Studies of Men and Books*.

Learning in 1879 of the severe illness of Mrs. Osbourne, whom he had met some years previously, he decided to go to California, her home. He made the voyage in the steerage of an emigrant ship, and finished the journey across the continent in an immigrant train. These experiences he described in *The Amateur Emigrant* and *Across the Plains*. In 1880 he married Mrs. Osbourne. During the next ten years his quest for health took him to various places, and in 1890 he settled permanently in Samoa, where he soon became a commanding figure among the natives. Meanwhile he had published *Treasure Island*, a story of stirring adventures which met with immediate success; *Prince Otto*, a romance; *Doctor Jekyll and Mr. Hyde*, an account in story form of the dual personality which exists in every man; *Kidnapped*; *The Master of Ballantrae*; *A Child's Garden of Verses* and *Underwoods*, a second volume of verse, and the *Merry Men and Other Tales*. During his years in Samoa he wrote *David Balfour*, which is a sequel to *Kidnapped*, and *Saint Ives*, and he began *Weir of Hermiston*, which, although unfinished at his death, is by many critics regarded as his greatest work.



ROBERT LOUIS
STEVENSON

Stevenson's uncomplaining spirit, his cheerfulness and diligence in the face of disadvantages so great that to a less courageous man they might have seemed overwhelming, make him one of the most attractive of literary personalities. As a story-teller he rivals Scott, while his exquisite style places him in the front rank of the writers of his time.

STEVENS POINT, Wis., the county seat of Portage County, 100 miles north of Madison, on the Wisconsin River and on the Minneapolis, Saint Paul & Sault Ste. Marie and the Green Bay & Western railroads. The city is an important trade center for an extensive region and lies just north of the great potato-producing district. There is good water power, and more than one hundred industrial establishments, which include saw mills, foundries, knitting works and manufacturing of furniture, paper, fishing flies and

other articles, are located here. The city has a Carnegie Library and is the seat of one of the state normal schools. The place was settled in 1836. Population, 1910, 8,692; in 1920, 11,370.

STIBNITE, or **ANTIMONY GLANCE**, an ore consisting of antimony and sulphur. The color is lead-gray or blackish, and the mineral is very brittle. This ore is the source of most of the antimony of commerce.

STICKLEBACK, the popular name for certain small fishes, so called because of their dorsal spines. These fishes are found in both salt and fresh waters, are very active and voracious and live upon aquatic insects and worms. The sticklebacks are among the very few fishes which build nests for their young. The nest is composed of straw, sticks and similar materials, and is shaped like a muff. In it the eggs, yellow in color and about the size of poppy seeds, are deposited. The male guards the nest until several days after the eggs are hatched. The largest sticklebacks attain a length of seven inches.

STIKINE, *stikeen'*, **RIVER**, a small river in Western Canada which furnishes water communication between Northern British Columbia and the Pacific. From the Cassiar Mountains, in Northern British Columbia, where it rises, it flows northward, then westward and southward, and after crossing the narrow southern strip of Alaska, enters the Pacific, traversing a distance of 335 miles and draining an area of 20,000 square miles. It is navigable for 170 miles.

STILLWATER, **MINN.**, the county seat of Washington County, eighteen miles northeast of Saint Paul, on the Saint Croix River and on the Northern Pacific, the Chicago & North Western and the Chicago, Milwaukee & Saint Paul railroads. It has a beautiful location near the Dalles, which extend about thirty miles to the north along the river. The Minnesota state prison is located here, and the municipality contains a Carnegie library, a fine city hall, two convents and a city hospital. It is the industrial center of a large lumber region. The industrial establishments include lumber mills, grain elevators, flour and feed mills, foundries and machine shops and manufactories of wagons, boats, farm implements, shoes and other articles. Stillwater was settled in 1843, was incorporated as a village in 1848 and chartered as a city in 1854. Population, 1910, 10,198; in 1920, 7,735.

STILT, a plover, with exceedingly long, slender legs, which fact gives it its common name. It lives in fresh and salt marshes and feeds on insects. Few birds have greater power of flight, either in distance or rapidity. The stilt is always a peculiar-looking bird, whether walking as if on stilts or flying, with its long legs awkwardly stretched out behind it. There is only one North American species, the *black-necked stilt*, of the temperate regions. It is about fifteen inches



STILT

long, is white beneath and black above, with bright-red legs. The nest is a depression in the ground, lined with grasses.

STILTS, long sticks, to which are fastened foot rests, by means of which it is possible to walk with the feet some distance above the ground. The stilts used by children for playthings usually have long handles, which pass under the arms and are held by the hand. In countries where stilts are used for practical purposes, they are bound to the side of the leg, and the wearer carries a long pole to assist him in keeping his balance. The inhabitants of the lowlands in southern France find stilts a necessity a good part of the year, as much of the land is under water.

STING RAY, a group of fishes characterized by a long, whiplike tail equipped with one or more sharp spines near its base. This spine, or "sting," is not poisonous, but it inflicts a painful wound. There are about fifty species of these rays. All have flat disk-shaped bodies and some are from ten to twelve feet in diameter. They inhabit warm waters and have been found in tropical South American rivers.

STOAT. See **ERMINE**.

STOCK. Stock is that which represents the capital of a corporation. It should be understood in this article that, in speaking of stock, only the stock of corporations is meant. For instance, the capital stock of a certain corporation is \$30,000,000; in other words, that sum of money is invested, or is supposed to be invested, in that company. The people whose money makes up this total own *shares*, of a par value of \$100 each, or other

smaller sum. To show that an investor owns shares he receives a *certificate*, which indicates the number of shares issued to him and usually the par or face value of each share. Each certificate is numbered, and the complete record of the certificate is kept on the company's books. The company, out of its profits, pays *dividends* to its stockholders, but before dividends are paid the directors must *declare* or vote the dividends. Thus it is customary to say that the "directors declared the regular semi-annual dividend of three per cent," or whatever it may be. Dividends are usually declared twice a year, but monthly, quarterly or annual payments are also common.

Common and Preferred Stock. There are two principal kinds of stock, *common* and *preferred*. The preferred stock receives dividends at a fixed rate, and this rate must be paid before the common stock receives any dividends. Owners of preferred stock, however, usually are not allowed to vote at the meetings of the corporation. In other words, the preferred stock is like a loan. If the preferred stock is *cumulative* it shares in the profits of the business over and above the amount needed to pay equal dividends to both common and preferred stockholders. *Participating* preferred stock entitles the owner to vote at all meetings and gives him the same rights as a holder of common stock. A *proxy* is a form of power of attorney by which one stockholder authorizes another to act for him. Ownership of a majority of the common stock is necessary to control the affairs of the company. A stockholder is entitled to as many votes as he has shares.

Market Prices. Stock is usually issued at a *nominal*, or *par*, value. The usual par value of a share is \$100, but shares of a par value of \$1, \$5, \$10, \$25 and \$50 are not rare. Par value is like the words on a coin which say it is worth a certain amount of money. Market value or price is determined by the earning power of a company. For example, the common stock of a certain company pays 5 per cent dividends a year. This is a fair return on the investment, the normal rate of interest on money loans being about six per cent. In consequence, the common stock fluctuates in market price from a little below par to a little above. If, however, the company's business warranted dividends of 10 per cent a year, the market price would jump to about \$175 or \$200 a share. The propor-

tionate return on such an investment would be the same as in the first case; the people to profit by the rise in price would be those who had paid the low price and were now receiving the high rate of interest. In some states in recent years stocks are issued without a par value, the market value alone indicating the standing of the issue.

Purchasers of stock must bear in mind the difference between investment and speculation. A man may be willing to accept a low return on his money if he knows that the principal is safe, but if there is any danger that he will lose his principal, he demands a high interest. This fact explains why the stock of mining companies, for example, often pays as high as twenty or thirty per cent (or even more) interest on the amount invested. On the other hand, if the business is of a conservative nature, large profits will result in a rise in the market price of the stock.

Related Articles. Consult the following titles for additional information:

Broker Corporation Stock Exchange

STOCK EXCHANGE, an organization of business men engaged chiefly in buying and selling stocks and bonds. The name is also applied to the building where these financial operations are carried on. The first stock exchange was organized at London in 1801. In the early years of the stock exchange a member might trade there any sort of security he wanted to handle. The good stock and the bad had equal chances of getting the purchaser's attention. Ultimately this defect was recognized; a sort of censorship was instituted, and a list was made of all securities which might be exchanged. To-day a company which wishes to market its stock on the exchange must prepare for the board of control a financial statement and submit it to the exchange. If the board is satisfied as to its value, the stock is placed on its list of recognized securities. If it is rejected it must be sold on the "curb," that is, the street, if sold at all. Under normal conditions the exchange as a body does not attempt to control prices and is not responsible for fluctuations. The number of those who are constantly trying to boost prices and of those who are trying to lower them is about equally divided, and equilibrium is thereby maintained.

Membership in stock exchanges is limited to the number of those who can conduct the

business to be done. The cost of a seat fluctuates according to financial conditions. In 1896 a seat on the New York Stock Exchange was worth \$20,000; in 1905 to 1906, \$95,000. In normal times the price of membership on the stock exchange of Saint Louis, Baltimore, Philadelphia and Chicago ranges from \$1,500 to \$5,000. The payment of the membership fee is only a step in the initiation. One must be formally recommended and then elected by vote.

STOCK'HOLM, SWEDEN, the capitol and chief city of the country, is beautifully situated on the east end of Lake Malar and a number of islands and peninsulas which are separated by fiords and surrounded by forests. Because of this feature Stockholm has been called the "Venice of the North." The older portions of the city have narrow streets, but the newer parts are laid out on modern plans and contain numerous squares, which are ornamented with monuments and statuary. There are also a number of beautiful parks about the city. The most important structure is the royal palace. Other buildings of importance are the customhouse, the exchange bank, the townhall, the parliament house and the national library, national museum and academy of arts and sciences. Among the churches worthy of mention are the Stor Kyrka; the Riddarholms Kyrka, which is the burial place of the Swedish kings, and the Katarina Kyrka. The city also contains a monument to Gustavus III and statues of Gustavus Adolphus and Charles XII.

There are a number of important educational institutions, including a polytechnic school, a school of forestry and a medical institute. The royal library has over 300,000 volumes and a large collection of pamphlets. Among the learned societies are the Royal Swedish Academy of Sciences and the Swedish Academy. Stockholm is an important industrial center and has manufactures of furniture, tobacco, soap, sugar, malt liquors, and foundry and machine shop products. Shipbuilding is also an important industry. The city has a large trade, and its imports outrank those of any other city of Sweden. Population, 1921, 419,429.

STOCK'TON, CAL., the county seat of San Joaquin County, seventy-eight miles northeast of San Francisco, on an arm of the San Joaquin River, at the head of navigation, and on the Atchison, Topeka and Santa Fé, the

Western Pacific and the Southern Pacific railroads and several interurban lines. The city is the center of a rich agricultural and dairying region, which is noted for its natural beauty and equable climate. It was the outfitting point for the miners who went to California in the "rush of '49," and is the gateway to the Yosemite National Park.

It is the trade center of the San Joaquin valley and handles large amounts of lumber, grain, live stock, fruits and vegetables. There are oil and natural gas wells in the valley, and the manufactures include agricultural and mining implements, flour, foundry products, window glass, leather, woollens, canned goods, soap and fuel briquettes. The Western Normal, the state hospital for the insane, Saint Mary's College and Saint Agnes Academy are located here. The city has a public library and a county law library. Notable structures are a courthouse, a post-office, the Masonic Temple, the Commercial and Savings Bank building and Farmers and Merchants Bank building. The place was founded by Charles M. Weber in 1849 and was named in honor of Robert Field Stockton of the United States Navy. It adopted the commission form of government in 1911. Population, 1910, 23,253; in 1920, 40,296, a gain of 73 per cent.

STOCKTON, FRANCIS RICHARD (1837-1902), an American writer of humorous stories, born at Philadelphia. After graduation from the Philadelphia high school he applied himself to wood-engraving and contributed numerous illustrations to books and magazines. But he soon abandoned this pursuit for journalism. He was employed successively on the Philadelphia *Post*, the New York *Hearth and Home*, *Scribner's Monthly* (afterward the *Century Magazine*) and *Saint Nicholas*. His reputation rests, however, upon his short stories and humorous sketches. He told the most impossible tales with a realistic effect irresistibly humorous. He wrote several novels and a number of children's stories. His first work which attracted general notice was *Rudder Grange*. His best-known stories are *The Lady or The Tiger?*, his most popular story; *The Late Mrs. Null*, *The Casting Away of Mrs. Lecks* and *Mrs. Aleshine*, *The Merry Chanter*, *Captain Horn* and *The Girl at Cobhurst*.

STOD'DARD, RICHARD HENRY (1825-1903), an American poet, critic and essayist,

born at Hingham, Mass. He learned the trade of an iron molder and worked at it for several years. Ultimately he began to write for periodicals, and in time devoted much attention to literature. From 1853 to 1870 he worked in the New York custom-house; from 1886 until his death he was editor of the *New York Mail and Express*. Among his numerous writings are *Footprints*, *Songs of Summer*, *The King's Bell*, *The Book of the East* and *Memoir of Edgar Allan Poe*.

STOICISM, *sto' i siz'm*, a system of philosophy developed by Zeno in the latter part of the fourth century B. C. The name comes from *stoa*, meaning *porch*, the place at Athens where he taught. Zeno was highly esteemed by the Athenians, and he lived to an advanced age; after his death his system was continued and perfected by his followers. Stoicism became firmly established in Rome, and numbered Cicero, Seneca, Marcus Aurelius and other Romans among its adherents.

Fundamentally, stoicism is the doctrine "that no external thing alone can affect us for good or evil until we have woven it with the texture of our mental life." In other words, it does not influence us unless we permit it to determine our thoughts or acts. Necessarily the doctrine presupposes belief in freedom of the will. Its chief ethical value is its insistence upon the unimportance of external circumstance as compared with our reaction to it. It inculcates courage, self-control, temperance and justice.

In the popular sense a *stoic* in one who is not easily excited, who represses his emotions and is apparently or professedly indifferent to pain and not dependent for happiness upon worldly pleasure.

STOMACH, *stum'ak*, an organ of digestion, formed by the expansion of a portion of the alimentary canal. The human stomach is situated on the left side, just below the diaphragm. It is cone-shaped and turns up at both ends. It has four coats—the serous, or outer; the muscular, which serves to force the food, after it is made into chyme, toward and through the pylorus, to keep the orifice closed till the food is digested and to mix the food thoroughly with the gastric juice; the cellular coat, and the inner, or mucous, coat, which is soft, smooth and velvety and contains the glands which secrete the gastric juice. It has been estimated that there are 5,000,000 openings of these glands in this

membrane. The stomach has two openings, the cardiac through which the food enters from the œsophagus, and the pyloric, through which the food enters the intestines. See DIGESTION.

STONE. See ROCK.

STONE, HARLAN FISKE (1872–), an American lawyer, educated at Amherst, and Columbia University School of Law. From 1899 he was lecturer on law, and from 1910 dean of the Law School at Columbia, until March, 1924, when he was appointed Attorney-General of the United States by President Coolidge.

STONE AGE, that period in the history of any people during which their tools and weapons were made of stone. From the relics that are found in various parts of Asia, Africa and America, it seems evident that stone was the first material used by any people for tools and weapons.

The implements which have been found naturally divide the Stone Age into two epochs. During the first of these, the implements were rude and simple. Later relics are of many varieties of stone, and some are highly polished; a greater variety, too, is seen—axes, hammers, knives, daggers, spear and arrow heads, saws, chisels, borers and scrapers, all have been found. We know that the people of the Stone Age had some domestic animals and that they built rude houses and, in some cases, put together large mounds of stone as burial places for their dead. See BRONZE AGE; IRON AGE; LAKE DWELLINGS.

STONE CHAT, a common European bird, which lives upon moors and in other open places. It belongs to the warbler family.



STONE CHAT

The peculiarity of its note, which sounds somewhat like two small stones struck together, gives it the name. The bird runs very rapidly and feeds on worms, beetles, insect

larvae and grains. The eggs, from four to five in number, are greenish-blue and spotted. The blue Irish titmouse is a stone chat.

STONEHENGE, *stone'henj*, a celebrated ruin of what is believed to have been a prehistoric place of worship, situated in Wiltshire, Southern England. It consists of a group of huge, rough-hewn stones, from the positions of which it is believed the original plan embraced a horseshoe of stone blocks enclosed within two circles of stones. The outer circle, which is about three hundred feet in circumference, consisted, when entire, of thirty upright stones, each about sixteen feet high, placed at intervals of three and one-half feet, with thirty squared stones resting upon them. The inner circle, which is eight feet from the outer, consisted of about thirty stones, six feet in height, without imposts. The horseshoe consists of five groups of three stones, two uprights with an impost. Before each group stood three smaller upright stones. Inside this is a large slab, supposed to have been an altar. The whole is surrounded by a double mound and ditch, and there is also an avenue leading from the northeast, bounded by a mound and ditch. These circles were probably formed in connection with the Druidical or some other old religion. Originally private property, Stonehenge was presented to the British government as a national memorial in 1918.

STONE MOUNTAIN, an enormous, gray granite rock, a few miles northeast of Atlanta, Ga., which is to be made into a Confederate memorial. The rock mass is 800 feet high and 1,500 feet long. It is planned to cover part of the surface with relief sculpture representing Confederate soldiers mounted and on foot. The figures will be fifty feet high and seen from a distance the whole will show a great army marching forward, part of it mounted, part on foot. Many of the figures will be portraits of Civil War leaders—Lee, Stonewall Jackson and others. The undertaking is in the hands of the Stone Mountain Confederate Memorial Association. The work will be under the direction of Gutzon Borglum (which see).

STONE RIVER. See MURFREESBORO, BATTLE OF.

STONES, PRECIOUS. See PRECIOUS STONES.

STONY POINT, N. Y., a town in Rockland County, at the head of Haverstraw Bay, on the Hudson River, forty-two miles north of New York City, on the West Shore and

other railroads. It is on a rocky promontory, which was fortified by the Americans early in the Revolution. The fort was captured, strengthened and garrisoned by the British under Clinton in May, 1779. Washington then ordered General "Mad Anthony" Wayne to regain this position. On July 16, with 1,200 men, he surprised the fort at midnight, entered it with a rush and forced the garrison to surrender at the point of the bayonet. The Americans did not fire a gun; they lost fifteen men killed and eighty-three wounded; the British lost sixty-three killed and 553 captured. Soon after the capture the fortifications were destroyed and the place was abandoned. The ruins of the fort are included in a small national park created in 1902. Population, 1910, 3,651.

STORAGE BATTERY. See ELECTRIC BATTERY.

STORK, a large, long-legged bird related to the heron. It frequents swamps and marshes, but is sometimes found in the haunts of man, and occasionally builds its nest on the roofs of inhabited houses. The birds eat frogs, eels and reptiles, and have an economic usefulness. In parts of Europe they are venerated and are birds of good omen. They have no voice; the only sound they utter is a peculiar clattering of the bill.



STORK

The common stork is found in summer throughout Europe and Central Asia. In winter it migrates southward. This bird has black wing coverts, but otherwise the plumage is white. The bill, legs and toes are reddish. A pair returns year after year to the same nest. The eggs are white and from four to five in number. The South American storks are the *maguari* and the *jabiru*. The Asiatic species are the *Japanese stork*, the *white-necked stork*, the *black stork* and the *adjutant*.

STORMS, violent disturbances of the atmosphere, usually accompanied by rain, snow and hail, sometimes by thunder and lightning. Storms are *general* or *local*, and are occasioned by the unequal heating of the atmosphere, which causes unequal pressure over adjoining areas.

Fair and foul weather follow each other in continuous succession over most of the world. The frequency and violence of the changes may vary at different seasons of the year, but in general these are due to local conditions.

A study of the weather maps issued by the United States Weather Bureau shows that there are always in the country one or more areas of low pressure, surrounded by areas of high pressure. The areas of low pressure are those of low barometer and high temperature. They may have a diameter of from 500 to 1,000 miles, and the winds blow toward them from all directions. In the center of the low pressure areas, condensation takes place, followed by rain or snow.

Storm Centers. In the temperate latitudes of the northern hemisphere, the storm center moves eastward, its course usually being from southwest to northeast. In the tropics its direction is westward. In the southern hemisphere, these directions are reversed. The storm centers which move across the United States are usually lost in the Atlantic, only a few reaching Europe. When they do extend thus far, they usually strike the continent north of the British Isles; so in a few instances they have been known to strike the British Isles and even extend as far south as France and Spain. The rain-bearing wind usually comes from the southwest or south, and the area of low pressure is succeeded by one of high pressure, from which the wind blows outward. A north or northwest wind produces a clear sky, a high barometer and a low temperature. In the northern Mississippi valley such a wind often causes a drop of 15° or 20° in the thermometer in less than an hour.

Storms of this character are *cyclonic* in their nature; that is, they are caused by currents of air moving from all directions into the area of low pressure, and have a rotary motion on a large scale. They are most frequent in the spring and autumn months. Over the sea, in the tropical latitudes, they often attain such violence as to be destructive to shipping. These storms should not be confounded with the so-called cyclones of the United States, which are tornadoes and cover only a very small area.

Storm Predictions. General storms can usually be predicted from one to two days in advance. They are preceded by a falling barometer, a rise in temperature and cloud-

iness in the west, which usually begins with the formation of long streaks of cirrus clouds. Storms may last from one to ten days, according to the area which they cover and the rapidity with which the area of low pressure moves forward, but their duration seldom exceeds three days.

Related Articles. Consult the following titles for additional information:

Blizzard	Snow
Cyclone	Tornado
Hail	Typhoon
Hurricane	Weather Bureau
Monsoon	Whirlwind
Rain	Wind



STORY TELLING. Perhaps there is no combination of words which the average child uses oftener or speaks more eagerly than "Tell me a story." From the time the child is able to talk until long after he is well able to read stories for himself, mother, father, big sister hear the words over and over—"Tell me a story." There is a popular fallacy that anybody can tell a story; almost anybody will attempt to. But the results are often so confused, tedious and pointless that we can imagine that only because the need for a story is to the child a very pressing one would he accept such results.

We sometimes hear the words "the art of story telling;" and the expression is none too strong. Story telling is an art, but that need not frighten anyone, for it is an art which anyone may master sufficiently well to make the telling of a story a pleasure to the one who does it as well as to the children who listen. There are no absolute rules to follow, but certain points must be kept in mind if the results are to be as satisfying as possible.

The Main Purpose of Story Telling. The first important point that needs consideration is the purpose of story telling; for only as the purpose is understood and accomplished can the success or failure of story telling be judged. If we ask a child why he demands stories so constantly, we shall without doubt receive some such reply as, "Because I like to hear them." And that is, after all, the real purpose—to give pleasure. If the story fails in this it fails in all. The art of story telling

is first, last and all the time an art of entertainment, and if it does not entertain it is no art.

Other Purposes. There are, to be sure, other values to story telling; it accomplishes certain things which, with the child, can be brought about in no other way. But these are secondary results, and are by no means to be attained without the primary one—the giving of pleasure.

One of the very practical results of story telling is that it encourages concentration. It will almost always be found that a child who is used to listening to poems or to stories hears better and more easily than a child who has not been so trained. Then, too, a child who has heard all his life good stories well told uses without effort words which are entirely foreign to the vocabulary of another child.

Some people object to having fairy stories told to children because they fear that the imagination may be overdeveloped. There is, however, little fear of this. There is far more danger that the imagination will be underdeveloped, and it is just this danger which the telling of wholesome stories helps to guard against.

One of the most important of all the benefits which a child may derive from listening to good stories is the broadening of his sympathies and comprehension. Most of us live but one kind of a life, and have little opportunity to come in touch with lives spent in totally different surroundings and under totally different circumstances. This has an inevitable narrowing tendency, and there is nothing which can so effectually offset this tendency as good stories which arouse interest in other lives, other conditions, other creatures, other lands.

Telling Stories Better than Reading. A person who feels no ability to tell stories is likely to think that reading aloud can supply the need; but anyone who has tried both knows that there is a great difference. The personal element is almost entirely lacking in reading aloud. The eyes of the reader cannot meet and hold the listener's eyes, and the child is far more likely to become restless and lose interest.

The Essentials of a Good Story. Even the most skilful of story tellers cannot make all stories interesting to children; widely as the different kinds of tales which are capable of interesting children differ, they all have some-

thing in common—there are certain qualities which a story must possess before it can ever be a favorite or even be tolerated.

First, it must have a definite beginning and a definite ending. No long introductory explanations are possible in a child's story; the action must begin at once. And the action must have worked itself out to its logical end before the story closes. The desire to make a story a "piece out of life" has led many writers of short stories for grown people to end their tales in the vaguest, most indefinite way; we do not know what really happened to the hero or heroine—we can only conjecture. But the child must know absolutely what happened, and if he can know that his story people were not only happy when the story closed but "lived happy ever after," so much the better.

Another requisite is that the story have action from first to last. Asides, moralizing, description, unless they are very brief, will not do. The characters must be moving, accomplishing something all the time.

The child's invariable desire for a happy ending to a story is simply an outgrowth of his feeling of justice. If the bad person is not punished and the good person rewarded, the child feels, the world is all wrong. As people grow older and see the many apparent failures of this principle of justice to work out, they accustom themselves to the same thing in literature; but the desire for a happy ending is innate in everyone, and it is seldom if ever that a child should be harrowed with a tale in which the hero or heroine comes to grief.

There is one point which everyone who has told stories to children must have noticed, and that is their fondness for certain little details which to an adult seem absolutely unessential. If there is a bit of color somewhere in a story, and it is left out in the fifth or the eighth or the tenth telling, the child misses it and feels disappointed. One woman declares that when she was a little girl the story of the Ugly Duckling never seemed quite the same to her if the old Spanish duck with the red rag around her leg was left out.

One device which is not really necessary in children's stories but which adds greatly to their attractiveness to the child mind is the repetition of certain words or phrases. This may take the form of a simple repetition of descriptive adjectives applied to a character, as the "little small wee bear" in the story of

the *Three Bears*, or it may be more elaborate—the repeating of several lines of a speech. Just why this makes so strong an appeal to children is not quite plain, but it is certain that it does so. One worker, who had had much experience telling stories to children, made systematic inquiries as to what stories children really like best, and discovered that the prime favorites were *The Three Bears*, *The Three Little Pigs* and *The Little Pig That Wouldn't Go Over the Stile*. Each of these stories has much repetition, and doubtless this fact has something to do with their popularity, though the stories have all of the characteristics of good children's stories.

How to Tell a Story. Now a story consists of the gathering up of one set of emotional events from a possible million. What makes a tale tedious? Trying to mention as many of the million as possible, instead of keeping to the one set. What makes it confused? Trying to give the events without keeping in mind that they are in one set—that is, related definitely to each other. What makes a story pointless? Forgetting that, as the set of events is emotional, it must lead to some climax, some happening or point.

Once we get the idea of what a story really is, and hold to it, we are pretty likely to find that we, too, can tell a story well, after a little practice. Your "natural" storyteller—the one who seems to have a veritable "gift" for telling stories to children—is keenly alive and constantly awake to what a story is, and because she is so, follows some such rules as these:

Know Your Story. Know it so well that you feel free while you are telling it—certain just where each point is to come in, and sure of your climax. A few stories well learned is a better plan than many imperfectly known and thus poorly told. Do not feel that a story must always be told in the same words. Probably it will not be told twice alike, for the circumstances of its telling are never twice the same. If, however, there are conversations or familiar passages or some of the repetitions of which children are so fond, they should not be changed.

Be Happy In It. Your enjoyment and appreciation will convey themselves to the children. "Teacher makes us all laugh when she tells *The Hare and the Tortoise*. We wish she'd tell it every day." No one can tell really well a story which seems to him pointless or foolish or uninteresting.

See As You Tell. Live over again the events of the narrative as you talk. Try to see the things happen, rather than to think overmuch about your words, and the story will unconsciously become vivid, dramatic and interesting.

Keep the Point in Mind. Let the story shape itself gradually, always with this one group of emotional events in mind. Don't drag in anything, however interesting, that is not closely connected with the business of the story. Let all you say illuminate your text in some way.

Telling "The Three Goats." The following story was told just as it is given here, by a teacher familiar with the principles of good story telling. Notice (1) her familiarity with it, (2) her own evident enjoyment of it, (3) its vividness and action, and (4) how all that is told helps on the movement of the tale. There is no attempt at moralizing, and yet how plainly the results of the various actions come out!

The Three Goats

Once upon a time there were three goats who were going to the green pasture across the river to eat, and eat, and eat, so that they would become very fat. They all three happened to be named "Gruff."

Now a great ugly troll lived under the bridge they had to cross to reach the green pasture. Ah, but he was a monster; his eyes were as big as plates and his wiggly nose as long as a hoe-handle!

The youngest goat Gruff stepped upon the bridge first.

"Trip trap! Trip trap!" whispered the bridge.

"Who is tripping over my bridge?" called the dreadful troll.

"Oh! it is only I, the very smallest of the goats Gruff."

"I'm coming to eat you up!" roared the troll.

"Please, please don't! I wouldn't make a mouthful for you. Wait till the second goat Gruff comes. He is much larger than I am."

"Trip on, then. I want a bigger mouthful," growled the troll.

Soon the second goat Gruff came along.

"Trip trap! Trip trap!" said the bridge.

"Who is tripping over my bridge?" called the dreadful troll.

"It is I, the second goat Gruff," said the goat in a voice like yours or mine.

"I'm coming to eat you up!" roared the troll.

"Please don't! I'm not very big. Wait till the third goat Gruff comes. He is much larger than I. He'd be well worth eating."

"Trip on, then. I want a very large meal," replied the ugly troll.

Very soon the big goat Gruff came.

"Trip trap!! Trip trap!!" called the bridge. It was ready to break with the weight.

"Who is stamping over my bridge?" called the dreadful troll.

"IT IS I, THE GREAT GOAT GRUFF!" called the largest goat in a voice as loud as the troll's.

"I'm coming to eat you up!" roared the troll.

"HO! COME ON, THEN, COME!" roared the great goat Gruff.

And the troll came. The great goat Gruff butted him with his great horns and threw him into the river in a hundred pieces. He never ate up anyone again who tried to cross the bridge.

Then the three goats Gruff ate, and ate, and ate, in the green pasture. Unless they have stopped, they are eating there still.

Kinds of Stories. Almost any kind of a story provided it has action and a definite beginning and climax may be told so as to interest children, but there are certain kinds which seem of right to belong to the child. First of these, perhaps, is the fable. Even very young children like and can appreciate fables, and the endowing of animals with human characteristics is no strain on their imagination. (This subject is treated under LANGUAGE AND GRAMMAR, and a number of fables are there given.)

It is likely that if any group of children were asked what kind of stories they liked best the majority of them would say, without hesitation "fairy stories." By this they mean not only stories in which real fairies take a part, but any stories in which supernatural events occur. The introduction of the supernatural troubles them not at all. It is to them the one great essential that virtue should be rewarded and wickedness punished, and if the reward and punishment are dealt out by fairy godmothers, enchanted princesses, kings' sons who are disguised as animals, so much the better. And the most of the old fairy tales present to the child moral truths and give him lessons in kindness and industry which he could receive so acceptably in no other way.

The ancient myths, many of them, have that in them which appeals powerfully to children. These should, of course, to the young child be told simply as stories, with no intimation that he is being instructed in the religion and science of the world in its childhood days.

Humor is an element which is all too often absent from children's literature; and that children do enjoy it is shown by their appreciation of nonsense tales—tales which have in them little of story, but plenty of just that quality which appeals to children as "funny."

The nature story may be made very valuable, but the danger is always that it will be overdrawn; that the children will be given ideas of things in the world about them which are untrue. This does not mean that no tales should be told in which animals talk or show human characteristics; it does mean that care should be taken not to humanize too much the dog, the butterfly, the violet waking in the spring.

Historical tales and Bible tales, well told, never fail to interest children, and the lessons which they carry find their way into the minds of the little listeners without the necessity for emphasis on the moral.

A number of stories illustrating these different classes are given here, some of them, the real classics, being given just as they were written; others have been specially adapted for telling, for it is one of the essential points about story-telling that a story which is adapted for reading is very often not adapted for telling. Other stories are found in the KINDERGARTEN department of this work, and in the article BIBLE, while numerous fables and some story poems are included in the department of LANGUAGE AND GRAMMAR. Under MYTHOLOGY is to be found a representative collection of myths.

The Frog and the Ox

A FABLE

As an ox was grazing in a marshy meadow, he happened to set his foot on a family of young frogs, and trod almost the whole of them to death. One, however, escaped, and telling his mother of the sad fate of the rest of her family, he said, "And mother, it was such a big beast! I never saw such a large one in my life."

"Was it as large as this?" said the old frog blowing her self as much as possible. "Oh!" said the little one, "a great deal bigger, mother." "Well, was it as big as this?" and she puffed out her speckled skin still more. "O mother, it is no use your trying to make yourself as big as it, for were you even to burst yourself you would not be near its size." The mother frog was much annoyed at this remark: so she once more tried to increase her size, and she burst herself indeed.

MORAL—Do not covet that which is beyond your reach.

The Donkey in the Lion's Skin

A FABLE

A donkey, having found the skin of a lion, put it on, and, going into the fields, amused himself by frightening all the animals he met. Seeing a fox, he tried to alarm him also. But Reynard, perceiving his long ears sticking out, and hearing his voice, at once knew who it was. "Ah!" said he, "I should have been frightened too, if I had not heard you bray."

MORAL—It is not wise to judge a man by the coat he wears.

Frau Holle
A FAIRY TALE

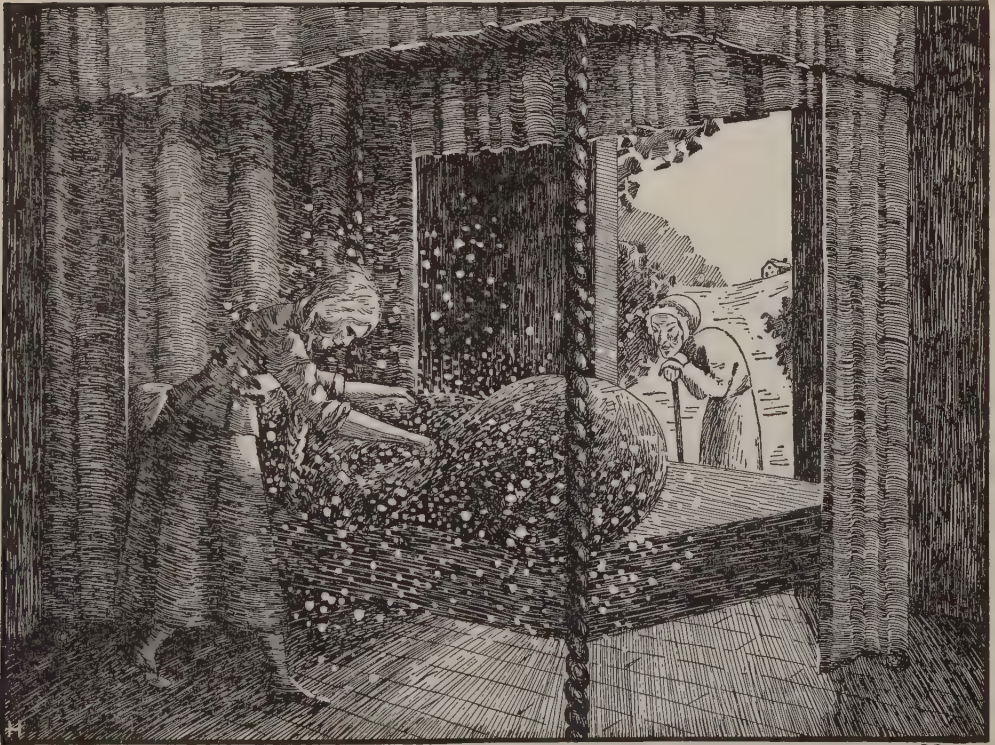
There was once a widow who had two daughters; one was as pretty as could be, and worked hard for her living; the other was ugly and idle.

Now, it chanced that the widow loved the ugly daughter better than the pretty one, because she was her very own, whilst the pretty maiden was only her step-daughter. So, besides doing all the work of the house, the poor girl was sent every day to sit beside the village well and spin a bundle of flax into yarn. Sometimes she had to work so hard that her poor little fingers were covered with blood;

consciousness, and when she came to herself again she found that she had fallen into a beautiful meadow, decked with every sweet and lovely flower, where the sun was shining brightly.

As she strolled along the meadow path, she came to an oven full of bread. "Take us out! take us out! or we shall burn," cried the loaves; "we are just baked enough."

So the girl opened the oven door and took out the bread and then went on her way again. Presently she came to an apple-tree weighed down with fruit, and it called to her as she passed: "Shake me! shake me! My apples are all ripe." So she shook the apple-tree till the apples fell like rain around her. When there were no more left upon the tree, she stacked them in heaps, and went her way.



THE FEATHERS FLEW LIKE
SNOWFLAKES

and one day, when this happened, and a few drops of blood had fallen upon the spindle, she bent over the well to wash it clean again, and dropped it in.

She ran weeping to her step-mother, to tell her what had happened, and the angry woman scolded her without mercy. "As you have let the spindle fall in," said she, "you must just go and fetch it out again."

So the poor little maid went back to the well, and in her sorrow and despair, she jumped straight into it, to see if she could find her spindle. At once she lost all con-

sciousness, and when she came to herself again she found that she had fallen into a beautiful meadow, decked with every sweet and lovely flower, where the sun was shining brightly. As she strolled along the meadow path, she came to an oven full of bread. "Take us out! take us out! or we shall burn," cried the loaves; "we are just baked enough." So the girl opened the oven door and took out the bread and then went on her way again. Presently she came to an apple-tree weighed down with fruit, and it called to her as she passed: "Shake me! shake me! My apples are all ripe." So she shook the apple-tree till the apples fell like rain around her. When there were no more left upon the tree, she stacked them in heaps, and went her way.

The old woman spoke so kindly that the girl took courage and agreed to stay with her.

She worked as hard as she was able, and pleased the old woman in everything she did. She shook the bed with such a will that the feathers flew like snow-flakes. So she led a happy life, with never an unkind word to grieve her, and had boiled and baked meats to eat every day. Time passed on, and the little maid grew pale and sad, though she herself could not tell at first what ailed her. At length she thought it must be homesickness, for, although she was treated a thousand times better than ever she had been at home, she had a great longing to go back again. So she went to the old woman and told her how she felt.

"I have been very happy here," she said; "but I have such a longing to see my own people once again that I can stay here no longer."

"It is right you should wish to go home, my child," answered Frau Holle. "You have served me faithfully all this long time, so I will see that you have a safe journey back."

She took the girl by the hand and led her to a great gate, which stood wide open. As soon as she passed through, a shower of golden rain fell and covered her with glittering gold from head to foot, so that she looked as though she was clad in a golden mantle. "That is my gift to you, because you have been a good, hard-working girl," said Frau Holle, and then gave her as well, the spindle which she had let fall into the well so long ago.

Immediately afterward the gate shut with a clang, and the girl found herself back in the world once more, and quite near to her mother's house. As she entered the courtyard, the cock began to crow:

"Cock-a-doodle-doo-doo-doo!"

The golden girl's come back to you!"

Then the little maid went in to her mother and sister, who made a great fuss over her, now that she had come home covered with gold.

She told them all that had happened, and when the mother heard how her pretty daughter had come by her fortune, she was anxious that her ugly daughter should have the same good luck. So she sent her to sit by the side of the well, and put a spindle into her hand. The lazy girl had never pricked her fingers with spinning, but she thrust her hand into a thorn-bush, so that it might look as though she had.

Then she threw the spindle into the well, and jumped in after it.

She fell just as her sister had done, into a beautiful flowery meadow, and followed the same path.

When she came to the oven, the bread cried out as before: "Take us out, or we shall burn. We are just baked enough."

The lazy girl answered: "I am not going to soil my hands for you."

Soon she came to the apple-tree. "Shake me! shake me; My apples are all ripe," it cried.

But the girl tossed her head and went on her way. "If I were to shake you," she said

scornfully, I might get a bump on my head from one of you for my pains."

When she reached Frau Holle's house she saw her looking out of the window, but was not in the least afraid of her, because she had heard beforehand of her large teeth. She engaged herself to the old woman, and at first things went very well. She remembered the gold she would receive at the end of her service and did her work as well as she was able.

But very soon she grew lazy, and would not get up in the mornings. Then too, she neglected Frau Holle's bed shamefully, and scarcely shook it at all, so that there was not a feather to be seen. So her mistress soon tired of her, and told her to go home.

Miss Lazybones was delighted, for she thought the time had now come for the shower of gold but when Frau Holle led her beneath the great gateway, instead of gold there fell a shower of pitch. "This is the reward for your services," said the old woman, and banged the door behind the idle girl.

And so, when she reached home, covered with pitch, and as black as a sweep, the cock, perched on the wall beside the well, began to crow:

"Cock-a-doodle-doo-doo-doo!"

Your dirty girl's come back to you!"

And dirty the girl remained all the days of her life, for, try as much as she would, she could never wash the pitch off again.

This is one of the tales that has a very plain moral—so plain that it need not be pointed out to the youngest child. Even children sometimes object to the "goody-goody," "Sunday School" stories with their obvious lessons; but the wonder element in this story, the striking character of the reward and the punishment make the story very attractive to children.

The Little Pig that wouldn't go over the Stile

A NONSENSE TALE

One day, as a little old woman was sweeping her little house, she found a crooked sixpence, and she said, "I will go to the market and buy a little pig with this crooked sixpence."

So she did, and as she was coming home she came to a stile.

"Little pig, little pig, go over the stile," said the little old woman; but the little pig would not.

She went a little farther and met a dog, and she said: "Dog, dog, bite pig; pig won't go over the stile, and I shall not get home tonight." But the dog would not.

She went a little farther and met a stick and she said: "Stick, stick, beat dog; dog won't bite pig; pig won't go over the stile, and I shall not get home tonight." But the stick would not.

She went a little farther, and she met a fire. So she said:

"Fire, fire, burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the fire would not.

She went a little farther, and she met some water. So she said: "Water, water, quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the water would not.

She went a little farther, and she met an ox. So she said: "Ox, ox, drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the ox would not.

She went a little farther and she met a butcher. So she said: "Butcher, butcher, kill ox; ox won't drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the butcher would not.

She went a little farther, and she met a rope. So she said: "Rope, rope, hang butcher; butcher won't kill ox; ox won't drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the rope would not.

milk, I will kill the rat." So away went the old woman to the cow.

But the cow said to her, "If you will go to yonder hay-stack, and fetch me a handful of hay, I'll give you the milk." So away went the old woman to the hay-stack; and she brought the hay to the cow.

As soon as the cow had eaten the hay, she gave the old woman the milk; and away she went with it in the saucer to the cat.

As soon as the cat had lapped up the milk, the cat began to kill the rat; the rat began to gnaw the rope; the rope began to hang the butcher; the butcher began to kill the ox; the ox began to drink the water; the water began to quench the fire; the fire began to burn the stick; the stick began to beat the dog; the dog began to bite the pig; the little pig jumped over the stile; and so the old woman got home that night.

The Ugly Duckling

A NATURE STORY

It was glorious in the country; it was summer; the cornfields were yellow, the oats were green, the hay had been put up in stacks in the



"LITTLE PIG, LITTLE PIG, GO OVER THE STILE."

She went a little farther, and she met a rat. So she said: "Rat, rat, gnaw rope; rope won't hang butcher; butcher won't kill ox; ox won't drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the rat would not.

She went a little farther, and she met a cat. So she said: "Cat, cat, kill rat; rat won't gnaw rope; rope won't hang butcher; butcher won't kill ox; ox won't drink water; water won't quench fire; fire won't burn stick; stick won't beat dog; dog won't bite pig; pig won't get over the stile; and I shall not get home tonight." But the cat said to her, "If you will go to yonder cow, and fetch me a saucer of

green meadows; and the stork went about on his long red legs, and chattered Egyptian, for this was the language he had learned from his mother. All around the fields and meadows were great woods, and in the midst of these woods deep lakes. Yes, it was right glorious in the country.

In the midst of the sunshine there lay an old farm, with deep canals about it; and from the wall down to the water grew great burdocks, so high that little children could stand upright under the tallest of them. It was just as wild there as in the deepest wood, and here sat a Duck upon her nest; she had to hatch her ducklings; but she was almost tired out before the little ones came; and she seldom had visitors. The other ducks liked better to swim

about in the canals than to run up to sit under a burdock, and gabble with her.

At last one egg-shell after another burst open. "Pip! pip!" each cried, and in all the eggs there were little things that stuck out their heads.

"Quack! quack!" said the Duck, and they all came quacking out as fast as they could, looking all around them under the green leaves; and the mother let them look as much as they liked, for green is good for the eye.

"How wide the world is!" said all the young ones; for they certainly had much more room now than when they were inside the eggs.

"D'ye think this is all the world?" said the mother. "That stretches far across the other side of the garden, quite into the parson's field; but I have never been there yet. I hope you are all together," and she stood up. "No, I have not all. The largest egg still lies there. How long is that to last? I am really tired of it." And so she sat down again.

"Well, how goes it?" asked an old Duck who had come to pay her a visit.

"It takes a long time for this one egg," said the Duck who sat there. "It will not open. Now, only look at the others! They are the prettiest little ducks I ever saw. They are all like their father: the rogue, he never comes to see me."

"Let me see the egg which will not burst," said the old Duck. "You may be sure it is a turkey's egg. I was once cheated in that way, and had much care and trouble with the young ones, for they are afraid of the water. Must I say it to you? I could not make them go in. I quacked, and I clacked, but it was no use. Let me see the egg. Yes, that's a turkey's egg. Let it lie there, and do you teach the other children to swim."

"I think I will sit on it a little longer," said the Duck. "I've sat so long now that I can sit a few days more."

"Just as you please," said the old Duck; and she went away.

At last the great egg burst. "Pip! pip!" said the little one, and crept forth. He was so big and ugly. The Duck looked at him.

"It's a very large Duckling," said she. "None of the others looks like that; it really must be a turkey chick! Well, we shall soon find out. Into the water shall we go, even if I have to push him in."

The next day it was bright, beautiful weather; the sun shone on all the green burdocks. The Mother-Duck with all her family went down to the canal. Splash! she jumped into the water. "Quack! quack!" she said, and one duckling after another plumped in. The water closed over their heads, but they came up in an instant, and swam off finely; their legs went of themselves, and they were all in the water; even the ugly gray Duckling swam with them.

"No, it's not a turkey," said she; "look how well he uses his legs, how straight he holds himself. It is my own child! On the whole he's quite pretty, when one looks at him rightly. Quack! quack! come now with me, and I'll lead you out into the world, and present you in

the duck-yard; but keep close to me all the time, so that no one may tread on you, and look out for the cats."

And so they came into the duck-yard. There was a terrible row going on in there, for two families were fighting about an eel's head, and so the cat got it.

"See that's the way it goes in the world!" said the Mother-Duck; and she whetted her beak, for she too wanted the eel's head. "Only use your legs," she said. "See that you can bustle about, and bend your necks before the old Duck yonder. She's the grandest of all here, she's of Spanish blood—that's why she's so fat; and do you see? she has a red rag around her leg; that's something very, very fine, and the greatest mark of honor a duck can have: it means that one does not want to lose her, and that she's known by the animals and by men too. Hurry! hurry!—don't turn in your toes; a well-brought-up duck turns its toes quite out, just like father and mother—so! Now bend your necks and say 'Quack!'"

And they did so: but the other ducks round about looked at them, and said quite boldly:

"Look there! now we're to have this crowd too! as if there were not enough of us already! And—fie!—how that Duckling yonder looks; we won't stand that!" And at once one duck flew at him, and bit him in the neck.

"Let him alone," said the mother; "he is not doing anything to anyone."

"Yes, but he's too large and odd," said the Duck who had bitten him, "and so he must be put down."

"Those are pretty children the mother has," said the old Duck with the rag round her leg. "They're all pretty but that one; that is rather unlucky. I wish she could have that one over again."

"That cannot be done, my lady," said the Mother-Duck. "He is not pretty, but he has a really good temper, and swims as well as any of the others; yes, I may even say it, a little better. I think he will grow up pretty; perhaps in time he will grow a little smaller; he lay too long in the egg, and therefore he has not quite the right shape. And she pinched him in the neck, and smoothed his feathers. 'Besides, he is a drake,' she said, 'and so it does not matter much. I think he will be very strong: he makes his way already.'"

"The other ducklings are graceful enough," said the old Duck. "Make yourself at home; and if you find an eel's head, you may bring it to me."

And now they were at home. But the poor Duckling who had crept last out of the egg, and looked so ugly, was bitten and pushed and made fun of, both by the ducks and chickens.

"He is too big!" they all said. And the turkey-cock, who had been born with spurs, and so thought he was an emperor, blew himself up, like a ship in full sail, and bore straight down upon him; then he gobbled and grew quite red in the face. The poor Duckling did not know where he dared stand or walk; he was quite unhappy because he looked ugly, and was the sport of the whole duck-yard.

So it went on the first day; and then it grew worse and worse. The poor Duckling was hunted about by everyone; even his brothers and sisters were quite angry with him, and said, "If the cat would only catch you, you ugly creature!" And the ducks bit him and the chickens beat him, and the girl who had to feed the poultry kicked at him with her foot.

Then he ran and flew over the fence, and the little birds in the bushes flew up in fear.

"That is because I am so ugly!" thought the Duckling; and he shut his eyes, but flew on farther; and so he came out into the great moor, where the wild ducks lived. Here he lay the whole night long, he was so tired and sad.

Toward morning the wild ducks flew up, and looked at their new mate.

"What sort of a one are you?" they asked; and the Duckling turned about to each, and bowed as well as he could. "You are really very ugly!" said the Wild Ducks. "But that is all the same to us, so long as you do not marry into our family."

Poor thing! he certainly did not think of marrying, and only dared ask leave to lie among the reeds and drink some of the swamp water.

There he lay two whole days; then came thither two wild geese, or more truly, two wild ganders. It was not long since each had crept out of an egg, and that's why they were so saucy.

"Listen, comrade," said one of them. "You're so ugly that I like you. Will you go with us, and become a bird of passage? Near here is another moor, where are a few sweet lovely wild geese, all unmarried, and all able to say 'Quack!' You've a chance of making your fortune, ugly as you are."

"Piff! paff!" sounded through the air; and both the ganders fell down dead in the reeds, and the water became blood red. "Piff! paff!" it sounded again, and the whole flock of wild geese flew up from the reeds. And then there was another report. A great hunt was going on. The gunners lay around in the moor, and some were even sitting up in the branches of the trees, which spread far over the reeds. The blue smoke rose like clouds in among the dark trees, and hung over the water; and the hunting dogs came—splash, splash!—into the mud, and the rushes and reeds bent down on every side. That was a fright for the poor Duckling! He turned his head to put it under his wing; and at that very moment a frightful great dog stood close by the Duckling. His tongue hung far out of his mouth, and his eyes glared horribly. He put his nose close to the Duckling, showed his sharp teeth, and—splash, splash!—on he went without seizing it.

"Oh, Heaven be thanked!" sighed the Duckling. "I am so ugly that even the dog does not like to bite me!"

And so he lay quite quiet, while the shots rattled through the reeds and gun after gun was fired. At last, late in the day, all was still; but the poor little thing did not dare to rise up; he waited several hours still before he looked around, and then hurried away out of the moor as fast as he could. He ran on

over field and meadow; there was a storm, so that he had hard work to get away.

Towards evening the Duckling came to a peasant's poor little hut; it was so tumbled down that it did not itself know on which side it should fall; and that's why it stood up. The storm whistled around the Duckling in such a way that he had to sit down to keep from blowing away; and the wind blew worse and worse. Then he noticed that one of the hinges of the door had given way, and the door hung so slanting that he could slip through the crack into the room; and that is what he did.

Here lived an old woman, with her Cat and her Hen. And the Cat, whom she called Sonnie, could arch his back and purr; he could even give out sparks: but for that, one had to stroke his fur the wrong way. The Hen had quite small, short legs, and therefore she was called Chickabiddy Shortshanks; she laid good eggs, and the woman loved her.

In the morning they noticed at once the strange Duckling, and the Cat began to purr and the Hen to cluck.

"What's this?" said the woman, and looked all around; but she could not see well, therefore she thought the Duckling was a fat duck that had strayed. "This is a rare prize!" she said. "Now I shall have duck's eggs. I hope it is not a drake. We must try that."

And so the Duckling was taken on trial for three weeks, but no eggs came. And the Cat was master of the house, and the Hen was the lady, and always said "We and the world!" for they thought they were half the world, and by far the better half. It seemed to the Duckling that one might have another mind, but the Hen would not allow it.

"Can you lay eggs?"

"No."

"Then will you hold your tongue!"

And the Cat said, "Can you curve your back, and purr, and give out sparks?"

"No."

"Then you will please have no opinion of your own when sensible folks are speaking!"

And the Duckling sat in a corner and was in low spirits; then he began to think of the fresh air and the sunshine; and he was seized with such a strange longing to swim on the water, that he could not help telling the Hen of it.

"What are you thinking of?" cried the Hen. "You have nothing to do, that's why you have these fancies. Lay eggs, or purr, and they will pass over."

"But it is so charming to swim in the water," said the Duckling, "so nice to feel it go over one's head, and to dive down to the bottom!"

"Yes, that's a fine thing, truly," said the Hen. "You are clean gone crazy. Ask the Cat about it—he's the cleverest thing I know—ask him if he likes to swim in the water, or to dive down: I won't speak about myself. Ask our mistress herself, the old woman; no one in the world knows more than she. Do you think she wants to swim, and to let the water close above her head?"

"You don't understand me," said the Duckling.

"We don't understand you! Then pray who is to understand you? You surely don't pretend to be cleverer than the Cat and the woman—I won't say anything of myself. Don't make a fool of yourself, child, and thank your Maker for all the good you have. Are you not come into a warm room, and have you not folks about you from whom you can learn something? But you are a goose, and it is not pleasant to have you about. You may believe me, I speak for your good. I tell you things you won't like, and by that one may always know one's true friends! Only take care that you learn to lay eggs, or to purr, and to give out sparks."

"I think I will go out into the wide world," said the Duckling.

"Yes, do go," replied the Hen.

And so the Duckling went away. He swam on the water, and dived, but he was shunned by every creature because he was so ugly.

Now came the fall of the year. The leaves in the wood turned yellow and brown; the wind caught them so that they danced about, and up in the air it was very cold. The clouds hung low, heavy with hail and snow-flakes, and on the fence stood the raven, crying, "Croak! croak!" for mere cold; yes, one could freeze fast if one thought about it. The poor little Duckling certainly had not a good time. One evening—the sun was just going down in fine style—there came a whole flock of great handsome birds out of the bushes; they were shining white, with long, supple necks; they were swans. They uttered a very strange cry, spread forth their glorious great wings, and flew away from that cold region to warmer lands, to fair open lakes. They mounted so high, so high! and the ugly Duckling had such a strange feeling as he saw them! He turned round and round in the water like a wheel, stretched out his neck towards them, and uttered a cry, so high, so strange, that he feared as he heard it. Oh! he could not forget those beautiful, happy birds; and as soon as he could see them no longer, he dived down to the very bottom, and when he came up again, he was quite beside himself. He did not know what the birds were, nor where they were flying to; but he loved them more than he had ever loved anyone. He did not envy them at all. How could he think of wishing to have such loveliness as they had? He would have been glad if only the ducks would have let him be among them—the poor, ugly creature!

And the winter grew so cold, so cold! The Duckling had to swim about in the water, to keep it from freezing over, but every night the hole in which he swam about became smaller and smaller. It froze so hard that the icy cover sounded; and the Duckling had to use his legs all the time to keep the hole from freezing tight. At last he became worn out, and lay quite still and thus froze fast in the ice.

Early in the morning a peasant came by, and found him there; he took his wooden shoe, broke the ice to pieces, and carried the Duckling home to his wife. Then the Duckling came to himself again. The children wanted

to play with him; but he thought they wanted to hurt him, and in his terror he flew up into the milk-pan, so that the milk spilled over into the room. The woman screamed and shook her hand in the air, at which the Duckling flew down into the tub where they kept the butter, and then into the meal-barrel and out again. How he looked then! The woman screamed, and struck at him with the fire tongs; the children tumbled over one another as they tried to catch the Duckling; and they laughed and they screamed!—well was it that the door stood open, and the poor creature was able to slip out between the bushes into the newly-fallen snow. There he lay quite worn out.

But it would be too sad if I were to tell all the misery and care which the Duckling had to bear in the hard winter. He lay out on the moor among the reeds, when the sun began to shine again and the larks to sing; it was a beautiful spring.

Then all at once the Duckling could flap his wings: they beat the air more strongly than before, and bore him stoutly away; and before he well knew it, he found himself in a great garden, where the elder-trees stood in flower and bent their long green branches down to the winding canal, and the lilacs smelt sweet. Oh, here it was beautiful, fresh, and spring-like! and from the thicket came three glorious white swans; they rustled their wings, and sat lightly on the water. The Duckling knew the splendid creatures, and felt a very strange sadness.

"I will fly away to them, to the royal birds! and they will beat me, because I, that am so ugly, dare to come near them. But it is all the same. Better to be killed by them than to be chased by ducks, and beaten by fowls, and pushed about by the girl who takes care of the poultry-yard, and to suffer hunger in winter!" And he flew out into the water, and swam toward the beautiful swans: these looked at him, and came sailing down upon him with outspread wings. "Kill me!" said the poor creature, and bent his head down upon the water, and waited for death. But what saw he in the clear water? He saw below him his own image; and, lo! it was no longer a clumsy dark-gray bird, ugly and hateful to look at, but—a swan!

It matters nothing if one is born in a duck-yard, if one has only lain in a swan's egg.

He felt quite glad at all the need and hard times he had borne; now he could joy in his good luck in all the brightness that was round him. And the great swans swam round him and stroked him with their beaks.

Into the garden came little children, who threw bread and corn into the water; and the youngest cried, "There is a new one!" and the other children shouted, "Yes, a new one has come!" And they clapped their hands and danced about, and ran to their father and mother; and bread and cake were thrown into the water; and they all said, "The new one is the most beautiful of all! so young and so handsome!" and the old swans bowed their heads before him.



HE WAS NO LONGER A CLUMSY, DARK GRAY BIRD, BUT—A SWAN!

Then he felt quite ashamed and hid his head under his wings, for he did not know what to do; he was so happy, and yet not at all proud, for a good heart is never proud. He thought how he had been driven about and mocked and despised; and now he heard them all saying that he was the most beautiful of all beautiful birds. And the lilacs bent their branches straight down into the water before him, and the sun shone warm and mild. Then his wings rustled, he lifted his slender neck, and cried from the depths of his heart:

"I never dreamed of so much happiness when I was the Ugly Duckling."

We are not accustomed to thinking of this as a nature study, but it has all the elements of the nature tales which modern writers of stories for children produce in such abundance. The emphasis, to be sure, is on the *human* side of the animal characters; but the other side is not neglected. As we read the ugly duckling seems to us like a person, but he also seems like a duckling. The attitude of the other ducks toward the ugly duckling, who is near enough like them not to seem a stranger, and yet not exactly one of themselves; the instinct which makes the duckling, all unconscious that he is himself a swan, cry out when he sees the other swans; the instinct which keeps the hunter's dog, trained to pick up dead geese, from touching the live swan—all these are true to nature.

The lesson of the story, which is very plain, is a most beautiful one, and one which parents and teachers cannot afford to miss. There is many a child, awkward, conscious, large for his age, who is mistreated, laughed at, sometimes even abused, just because he is not like other children. And then, perhaps, later it is found to be just a repetition of the story of the ugly duckling; the child did not seem like other children because he was not like other children. He was something bigger, stronger, more beautiful than they, and for that reason it took him longer to develop.

We might read over and over some such statement as this: "Just because a child is different from others, just because he is not attractive as a child, we cannot judge what he will be as a man. Perhaps he will amount to more in the end than all of his normal associates." But would such a statement make much impression on us? When we read *The Ugly Duckling*, however, we find it impossible to forget the lesson it teaches, and we find ourselves more ready to say, when we see a misjudged child, "Look out. He may turn out to be a real ugly duckling."

The Gifts the Dwarfs Made

A NORSE MYTH RETOLD FOR CHILDREN

This is a story about dwarfs, little dark men who lived far down under ground and made wonderful things.

Sif, Thor's wife, was most beautiful, with her blue eyes, fair skin, and golden hair. Her hair! It was the most glorious hair that had ever grown on anyone's head—bright and soft and fine, and so long and heavy that when she let it down it covered her from head to foot like a golden veil. Of course she was very proud of it, and of course Thor was proud of it too and loved to watch her shake it out so that it shone and rippled like a golden waterfall in the sun.

One morning when she woke, Sif found that her hair had been cut off close to her head. A look into her polished silver mirror showed her that the most of her beauty had gone with her hair, and she scarcely dared face her husband; but when she told Thor his anger was terrible to behold.

"It is Loki, the wicked Loki, who has done this," he cried, "and he shall suffer for it."

For Loki was a crafty schemer, always trying to annoy someone, and particularly fond of troubling Thor.

It was no easy task for Thor to catch the thief, for Loki had the power of changing his shape to that of anything he chose, and he made good use of his power now. Finally, however, Thor found him and grabbed him by the throat.

"Confess," he cried, "that you stole Sif's hair."

But his grip was so strong that Loki could only gasp and wriggle.

"Unless you give it back," Thor continued, "I shall kill you here and now," and he loosened his grasp that Loki might answer.

"I did it," confessed Loki sullenly, "but I cannot give it back, for I opened my hands and scattered it all over the earth."

"Then you shall die!" thundered Thor, and would have kept his word had not Loki promised to get for Sif a new head of hair as beautiful as the first.

"Go then," commanded Thor, "and make haste."

Loki slunk away and crept into the earth where lived his friends the dwarfs. They were ugly and not always very pleasant, but Loki knew their skill and knew that they were proud to be called on to show it. So he implored them to make for him not only the golden hair, but gifts for Odin and Frey, Thor's powerful friends of whose anger Loki was afraid.

To anyone else it might have seemed like a very difficult matter to have to make a head of golden hair, but the dwarfs thought nothing of it. They brought their gold, and when they had softened it they spun it out into countless fine hairs. These they braided into a huge coil and gave to Loki.

"It may seem dead now," said the master-smith, "but when it touches Sif's head it will at once become alive and begin to grow, yet it will always be real gold."

Wonderful as this was it was not the most wonderful of the dwarfs' gifts. For how could anything be as wonderful as the spear which they made for Odin, the spear which however it was thrown never missed its aim; or as the ship which they made for Frey? For this ship, while it could be folded up and thrust into the pocket, could be made so large that hundreds of people might ride in it in comfort, and it sailed as well in the air as on the water and always in just the right direction, no matter which way the wind blew.

No wonder Loki was pleased, and no wonder he cried aloud to the master-smith:

"You are surely the most clever smith in all the world. No one else, I am sure, could make such things."

But someone was passing and heard these words and was not pleased to hear them; this was the dwarf Brock, who belonged to a dif-

ferent family of dwarfs. Without a word Brock turned and hurried to his brother's smithy, where he told his story; and Sindri, proud of his brother's faith in him, at once set to work. But first he said to Brock:

"You must blow the bellows while the gifts are being made, for I must go outside and work my magic spells or I shall not be able to accomplish anything wonderful; and whatever happens never leave off blowing the bellows." And with these words he tossed into the fire a pig's skin, and thrusting the bellows into Brock's hands left the smithy.

Now Loki, for all his boastful words, was a little bit worried, and to be on the safe side he came to Sindri's smithy to see what was going on there. But Brock did not see him—Loki was not so foolish as to let himself be seen. He turned himself into a gadfly, and settling on Brock's hand, stung him until the pain was



IN THE DWARFS' SMITHY

ferent family of dwarfs. When he heard the flattering words of Loki, whom he hated, he stopped and said:

"I do not know what your gifts are, but I know that whatever they are my brother Sindri can make something more wonderful."

"Let us make it a wager," cried Loki. "I will meet you tomorrow in Odin's great hall, and you may bring with you there three things made by your brother to present to Thor and Odin and Frey, and then we shall see what we shall see. And whichever one of us brings the most wonderful gifts shall have the other's head."

almost unendurable. But Brock blew the bellows and blew the bellows and never left off for a minute. When Sindri came back he said: "Good brother," and he drew out of the fire a boar with shining bristles of gold.

Next he threw into the fire some gold, and warning Brock once more to be careful never to cease blowing the bellows, he again left the smithy. This time Loki settled on Brock's cheek and stung even more sharply than before, so that the poor little dwarf had to set his teeth hard to endure the pain. But still he never left off blowing the bellows, and when Sindri came back, there was found in

the fire, instead of the lump of gold that had gone in, a heavy ring of gold, carved most beautifully.

"Once more," said Sindri, as he threw a lump of iron into the fire; "and this time be extra careful about the bellows." Brock turned to work bravely, but the gadfly Loki settled just over his eye, and stung him so fiercely that the blood ran down into his eyes so that he could not see what he was doing. The pain would never have made him stop, but he just had to put up his hand and wipe the blood from his eye, and at that moment Sindri entered the room.

"You have spoiled it!" he cried, as he sprang toward the fire; but when he drew out the heavy hammer to which the lump of iron had been changed, he comforted Brock by telling him that it was not entirely spoiled—"only the handle is too short," he added.

"Loki declared," said Brock, "that his gifts were not only beautiful and useful, but that they were magic gifts and could do wonderful things."

Sindri smiled, then whispered something in Brock's ear which made the little dwarf's eyes shine.

The next day he was at Odin's hall promptly at the appointed time, and he stood patiently by while Loki gave his gifts.

"It is even more beautiful than the old hair," declared Thor, as Sif shook out above herself the new golden threads.

"And such a spear!" cried Odin. "No enemy will ever be able to stand against me now."

"But mine is best," said Frey, "for we can all use it. Come," he went on, turning to the crowd which had assembled, "let's go for a ride in this wonderful new ship."

"Wait," cried Brock, "I have something, too, to offer."

"What, more gifts?" exclaimed Odin. "Of course we will wait."

But he looked a little disappointed when Brock put into his hand the heavy gold ring, for he had rings a-plenty, some of them as beautiful as this one.

"It is a magic ring," said Brock; "every ninth night, eight rings as large and heavy as this one will drop from it. That one ring alone would make a person rich."

Then he pulled from his huge sack the golden boar, glittering in the sunlight.

"It is named Gullinbursti," said Brock to Frey, "and it is a magic boar. On his back you can ride through the air as fast as a thought can fly, and even in the darkest night it need never be dark to you, for the bristles of Gullinbursti will give out light as he flits across the sky."

"I like him even better than the ship," said Frey; and Odin, who had been looking at his two gifts in silence, now said:

"And I like the ring better than the magic spear."

Brock grew more and more cheerful, and Loki's frown grew blacker and blacker, but he smiled again when Brock drew out and handed to Thor, the ugly, short-handled hammer. Thor himself looked none too well

pleased. Was the dwarf making fun of him? Hammers of this sort were to be had any day for the asking.

"But it is a magic hammer," exclaimed Brock. "It hits anything at which it is thrown and it never hits in vain. The strongest mountain will split, the strongest giant will die at a stroke of this hammer, and no matter how far it is thrown it will always fly back to your hand."

At the word "giant," Thor's look of displeasure changed. For were not the giants, the huge, ugly frost-giants, his worst enemies? And had he not always, up to this time, tried in vain to overcome them?

"Sif's hair is beautiful," he said, looking at his wife with pride in his eyes, "and the hammer is not beautiful, but I like the hammer better."

"Brock has won! Brock has won!" cried the crowd, who had heard of the wager and were none too fond of Loki, "and he may have Loki's head."

Brock turned for vengeance on Loki, but Loki had disappeared.

"I gave you the hammer; you will help me to find him," said the dwarf to Thor, and because he hated Loki and was grateful to Brock, Thor soon brought Loki back.

"You may take my head," said Loki; "it is yours by the terms of our wager. But if you touch my neck, or spill one drop of my blood, you will be taking more than belongs to you, and you must die."

"I'm afraid that is right," said Thor, and Brock was in despair.

But at last he decided that if he could not have Loki's head he would at least sew up his lying, boastful mouth; so he borrowed an awl from his brother Sindri, made holes through Loki's lips, and fastened them together with a leather thong.

And so for a while there was peace, because Loki could not make trouble with his tongue. But it was not for long. Loki managed to cut the cord and was soon going about making trouble just as he had always done.

The Story of Arnold Winkelried

There have been brave men in every age and in every country, but there have been few braver than Arnold Winkelried, who was not a king, not a general at the head of his troops, but just a poor Swiss peasant.

Over five hundred years ago, the little cantons of Switzerland had banded together and were making a desperate struggle for liberty; for the rulers of Austria, who ruled Switzerland too, oppressed the Swiss people terribly and gave them no rights of any sort.

At last in the summer of 1386, a great battle took place. The Austrian army, led by Duke Leopold, had four thousand horsemen and fourteen hundred foot soldiers, while the Swiss army had only thirteen hundred men altogether.

The Swiss are a brave people and the difference in the strength of the forces did not daunt them; but when they came to the actual conflict it seemed as if there were no way to be-

gin the attack. The Austrian army looked like a wall, but a wall which bristled with spear-points. Nowhere could the Swiss find or make an opening, and until they could, they knew that they should hurl themselves in vain on their enemies.

In the front rank of the Swiss there was one man, Arnold Winkelried, who was even braver than his comrades. His quick eye saw the difficulty, his brain told him the one way that it might be overcome, and he was brave enough to take that way; but the thought of his family held him for a time. Could he sacrifice them?

Still the two armies stood facing each other; still the Austrians in their pride looked scornfully at the little Swiss company. There should be a break in that solid phalanx! With a cry of "Make way for liberty!" Winkelried sprang forward, spread his arms, and gathering several of the enemies' spears, pressed them into his breast.

His deed was an inspiration to the Swiss, and they pressed forward into the little gap which he had made, and before the close of the day the Austrian army had fled from the field, leaving fourteen hundred dead, and the Swiss had won a complete victory. Five hundred years later, in 1886, a monument was erected on this battlefield in honor of the heroic self-sacrifice of a common Swiss soldier.

It is not to be understood that all historical stories told to children are to be stories of bravery on the battlefield. It is, in fact, true that while such tales stir the blood of young people, they cannot have the same effect that stories of the heroes of peace may have, for very few will ever be called upon to show bravery on a battlefield. However, young children are much more interested in stories which have vigorous action, and it is only as they grow older that they are really interested in the struggle and accomplishments of even the greatest statesmen.

Joseph and His Brothers

Jacob, the patriarch, had many sons; but of them all, Joseph, the youngest, was his favorite. Nor did he attempt to conceal this from the other ten sons. Naturally they were jealous of Joseph, and this jealousy was increased when their father gave to the boy a most wonderful coat—a coat of many colors.

Joseph, though a good boy, was somewhat spoiled by his father and was not always wise in the way he talked to his older brothers. For instance one day he went to them in great glee and said:

"Hear this dream which I have dreamed; Behold, we were binding sheaves in the field, and my sheaf arose and stood upright, and your sheaves bowed down and worshiped it."

This made the brothers very angry, and they cried:

"And do you really believe that you shall reign over us?"

But their anger was no warning to Joseph, and a few days later when he dreamed that the sun and moon and eleven stars bowed down before him, he foolishly told this dream to his father and to his brothers. And his father, seeing the effect it had on his older sons, rebuked Joseph.

"Shall I and thy mother," he said, "and thy brothers indeed come to bow down ourselves to thee to the earth?"

Now Jacob had many sheep, and the ten older sons had gone with them to a fine feeding-ground in Shechem. One day Jacob called Joseph to him and said:

"Go and see whether it is well with your brothers and with the flocks and bring me word."

But when Joseph reached Shechem he found no trace of his brothers. At last, after wandering about, he met a man who told him that the brothers with all of their flocks had gone to Dothan, and there Joseph found them.

As the boy advanced toward them across the field, one of them said scornfully to the others, "Behold the dreamer cometh," and they began to plot in their envy and their hatred how they might put the boy out of the way.

One brother suggested that they kill him and drop his body into a pit and then return to their father, declaring that some wild beast had eaten him. "Then we shall see," he said, "what shall become of some of his dreams." But Reuben, the oldest son, had pity on the boy and advised them not kill him but put him into a deep pit which was near at hand; for Reuben meant when the other brothers were out of the way to save Joseph and send him back to his father.

After they had put the poor boy into the pit, they sat at their meal discussing what they might do with him; and as they talked they saw coming toward them a company of merchants with camels, who were going down into Egypt. One brother, perhaps because he was avaricious, perhaps because he did not want Joseph killed, suggested that they sell the boy to the merchants to be sold again as a slave in Egypt.

This they did, and then, because they feared to tell their father of what they had done, they took Joseph's coat of many colors and dipped it in the blood of a kid and took it to their father. Even now they did not lie to him outright and say, "Your son has been killed;" they showed him the coat stained with blood and said, "Can you tell whether this is our brother Joseph's coat?"

And Jacob knew it instantly and said, "It is my son's coat. An evil beast has devoured him."

Meanwhile, Joseph had been carried by the merchants to Egypt and there sold to Potiphar, an officer of Pharaoh the king. And from the very first the young man prospered; for Potiphar found that he could be trusted. His master's wife, however, became angry with him most unjustly and told false tales of him to Potiphar, who in his wrath had him put into prison. But even here Joseph was fortunate,

for the keeper of the prison soon discovered that he was wise and trustworthy, and gave him control over all the other prisoners.

Now, in the prison at this time there were two servants of Pharaoh the king of Egypt—his chief butler and his chief baker.

One night each of these men dreamed a dream, and when Joseph visited them in the morning he said, "You look sad. Has anything troubled you?"

And in reply they told him of their dreams and begged him to interpret them for them; for in those days people believed that things which were to happen in the future were foretold by dreams. First the butler told his dream:

"In my dream, behold, a vine was before me; and in the vine were three branches, and it was as though it budded, and her blossoms shot forth; and the clusters thereof brought

And it all happened as Joseph had predicted, for in three days the chief butler was restored to his place, while the chief baker was hanged. But the butler promptly forgot the promise he had made to Joseph to remember him when he was restored to his place, nor did his promise occur to him for two full years. Perhaps he would not have thought of it even then, had not circumstances called it to his mind.

One night Pharaoh the king dreamed two dreams which troubled him strangely. All the magicians of his kingdom were sent for and questioned, but not one of them could give him an explanation of the strange dreams. Now it was that the butler remembered the young man who had so wonderfully interpreted his dream in the prison, and he told Pharaoh of Joseph. Joseph was summoned to appear before the king, and when he stood in the royal presence Pharaoh said:



JOSEPH CARRIED INTO EGYPT

forth ripe grapes. And Pharaoh's cup was in my hand; and I took the grapes and pressed them into Pharaoh's cup, and I gave the cup into Pharaoh's hand."

And Joseph interpreted thus:

"The three branches are three days. Yet within three days shall Pharaoh lift up thine head, and restore thee unto thy place; and thou shalt deliver Pharaoh's cup into his hand, after the former manner when thou wast his butler. But think on me when it shall be well with thee, and shew kindness, I pray thee, unto me and make mention of me unto Pharaoh, and bring me out of this house. For indeed I was stolen away out of the land of the Hebrews, and here also have I done nothing that they should put me into the dungeon."

The baker, pleased that the butler's dream had been so happily interpreted, then told his:

"I also was in my dream, and, behold, I had three white baskets on my head; and in the uppermost basket there was of all manner of bakemeats for Pharaoh, and the birds did eat them out of the basket upon my head."

But Joseph's interpretation of this was by no means so happy. He said:

"The three baskets are three days. Yet within three days shall Pharaoh lift up thy head from off thee, and shall hang thee on a tree, and the birds shall eat thy flesh from off thee."

"In my dream I stood upon the bank of a river and there came up out of the river seven kine, fat and well-favored, and they fed in a meadow. And soon there came up out of the river seven other kine, lean and ill-favored, worse than any I have ever seen in the land of Egypt; and the lean kine ate up the fat kine, nor were they, after they had eaten, any less poor and ill-favored. The second dream was very like the first. Seven good, full ears of corn came up on one stalk, and seven withered, thin ears, blasted with the east wind, sprung up after them and devoured them. Both of these dreams I have told to my magicians, but they were unable to interpret them.

Without hesitation Joseph replied:

"The seven good kine and the seven good ears are seven years; the seven thin kine and the seven blasted ears are another seven years. This means that there shall be another seven years of great plenty throughout all the land of Egypt, and then seven years of famine so severe that all the plenty shall be forgotten in the land of Egypt.

"Now the wise thing for the king to do is to choose a discreet man and put him in power over all the land, and let this man see that during the seven good years much food is stored up against the seven years of famine."

Pharaoh was much impressed by the advice of Joseph, and when he came to choose such a

man to set over all his kingdom, he decided that there was no one among his own people whom he could trust as he could this young man. Thus, at the age of thirty, Joseph became practically ruler over Egypt, second in rank only to the king.

Everything happened as the dreams had foretold, and during the seven years of plenty Joseph and his officers were very busy getting food into the storehouses. Thus when the years of famine did come there was food for all who came to Joseph to buy.

Now it was not only in Egypt that the famine was severe; all the neighboring countries were suffering, and men from all countries came into Egypt to Joseph to buy corn. And

they told him the truth about themselves—that they were all sons of one father and that they had one young brother at home in Canaan, and had had another. We can imagine Joseph's feelings when they said, "One brother is not."

Finally Joseph declared that he would sell them corn and allow them to go back to their own country only if one of them remained as a pledge that the other nine would return and bring with them their brother Benjamin. Simeon was the one chosen to remain, and the others departed without him, with their beasts of burden carrying sacks full of grain.

Now Joseph had commanded his servants to place in the sacks of grain the money which



JOSEPH MEETS HIS FATHER

among those who came were the ten brothers of Joseph. The youngest brother, the child Benjamin, they left with their father in Canaan, because the old man was so devoted to the child that he could scarce live away from him.

When the ten brothers of Joseph appeared before him, he knew them instantly in spite of the years that had passed. But they did not recognize, in the splendidly garbed favorite of the king, the brother whom they had sold, and who they imagined had died long since. To test them Joseph spoke to them roughly and even accused them of being spies; but

the brothers had brought with them to pay for the grain. Thus when they reached home they found that they had not only food, but all of their money.

Jacob their father, was much distressed when he heard that they had promised to take Benjamin down to Egypt with them, and cried out to them:

"You have bereaved me of my children. Joseph is not and Simeon is not and you will take Benjamin away." And for a long time he refused to let them return to Egypt.

At length, however, the famine became so severe that it was absolutely necessary that

they should in some way obtain more grain, and finally Jacob consented to allow Benjamin to go with them, Judah, one of the older brothers, pledging his own life that the boy should return unharmed.

When the brothers with the young Benjamin appeared before Joseph he was strangely moved, and he commanded that a feast be prepared for them in his own house. Joseph ate by himself, the Egyptians by themselves and the brothers by themselves, as the law of the Egyptians forbade them to eat with the Hebrews.

When the meal was over, Joseph commanded his servants to fill the brothers' sacks with grain and again to place each one's money in the mouth of his sack. In addition to this he ordered that his own silver cup be placed in Benjamin's sack.

The next morning when the Hebrews had gone but a little distance from the city Joseph's steward ran after them and overtook them and cried:

"Why have you repaid my master with evil when he did you nothing but good? One of you has stolen his silver cup."

The brothers protested that they knew nothing of the cup and declared that if it should be found upon any one of them that one should die and the rest should return as servants to Joseph. But when the search was made, the cup was found in Benjamin's sack.

Sadly the little procession which had started out so joyously turned and went back to the palace of Joseph. They could not understand what had happened; they felt certain that Benjamin had not taken the cup, but how could they prove this? And they were responsible to the boy's father for his safety.

Joseph, when he met them, pretended to be very severe, but when Judah declared that they were all ready to be servants of Joseph, Joseph refused saying:

"You may all go in peace, except the one in whose sack the cup was found. He shall be my servant." Then Judah stepped out before the rest of the brothers and told Joseph how he had become surety to his father for the boy, and begged Joseph to allow him to remain as bondman but to let the boy go back to his father.

"For how," he concluded, "shall I go up to my father and the lad be not with me?"

At this Joseph could restrain himself no longer. Sending all his servants and officers from the room, he cried:

"I am Joseph. Does my father yet live?"

Of course the brothers were afraid of his vengeance, but he comforted them and forgave them, assuring them that they had done him no harm, but only good, by selling him into Egypt.

"For God," he declared, "did send me before you to preserve life."

The joy and relief of the brothers of Joseph were beyond bounds and Joseph himself was no less happy. Even Pharaoh, the king, when he heard that Joseph's brothers had come, was pleased, and sent word that they were to return to Canaan for their father and their

households, and that they were then all to come down into Egypt, where he would allot to them for their homes the best land in the kingdom.

Joyfully the brothers returned home and told their father the wonderful story, which the old man could not at first believe. When he was at last convinced, he exclaimed:

"It is enough! Joseph my son is yet alive. I will go and see him before I die."

With their families and their servants, their flocks and their herds and their beasts of burden, the father and brothers of Joseph journeyed down into Egypt. They found that Pharaoh was as good as his word. He gave them land in plenty and they settled down in the strange land which yet did not seem strange to them because Joseph was ruler over all of it.

STOSS, VEIT (†1440–1533), a German sculptor, considered the greatest wood carver of Germany. He was born at Nuremberg, and spent his life there and at Cracow. Owing to his eccentric character he had many quarrels with the city authorities of Nuremberg, and he was several times imprisoned. He died at an old age, totally blind. Most of his works are religious and show deep spiritual feeling, a quality which was lacking in other artists of his time. His most famous wood carvings include the high altar in the Church of Saint Mary's, Cracow, and *The Angel's Salutation* in the Church of Saint Lawrence, Nuremberg. A relief representing the *Coronation of the Virgin* is in the Germanic Museum of Nuremberg. His best sculpture is *The Last Supper*.

STOVE, a piece of domestic furniture consisting of a box made of iron, brick or tile in which fuel is burned to heat rooms or houses or for cooking. The first stoves, made of brick, stone or earthenware, were very large. Iron stoves were first made in France early in the eighteenth century. From there they were introduced into England about 1716, and were adapted to the use of coal. In 1745 Benjamin invented a stove with a downward draft that caused an even distribution of heat over the sides. This was a great improvement over any stove that had preceded it, and from it developed the modern stove heater. Stoves did not come into general use in the United States until 1825. Prior to that time, dwelling houses were heated chiefly with open fireplaces. Country churches were not heated, but women carried foot stoves to church. These were small tin or sheet iron boxes, with perforated sides, enclosed in wooden cases. Just before the start to church the stove was filled with burning coals.

The advantage of the modern stove over the fireplace is its greater heating capacity. Whereas the best fireplaces utilize only about fifteen per cent of the heating power of the fuel, stoves make available from forty to sixty per cent.

There are now many designs of stoves upon the market, intended for burning wood, coal, coke, kerosene, gasoline, gas or electricity. Gas stoves are in general use in cities for cooking, while gasoline and kerosene stoves have for years been popular in isolated communities.

STOWE, HARRIET ELIZABETH BEECHER (1811-1896), an American novelist, best known as the author of *Uncle Tom's Cabin*. This book, published in 1852, had perhaps a greater influence than any other piece of fiction ever written, was translated into more than twenty languages and had an unprecedented sale. Though loose in construction and marred by signs of hasty composition, *Uncle Tom's Cabin* is nevertheless a strong book, because it tells vividly a story of slavery. It was dramatized shortly after its publication and has had wonderful popularity as a play.

Mrs. Stowe, sister of Henry Ward Beecher, was born at Litchfield, Conn., where her early life was spent. Her family moved in 1832 to Cincinnati, and four years later she was married to Rev. Calvin E. Stowe of that city. Her knowledge of the condition of the slaves was gained by visits to slave states and possibly by encounters with escaping slaves. *Uncle Tom's Cabin* was by no means her only work, but the others are practically unnoticed, because of the success of the one. Among the others may be mentioned *The Minister's Wooing*, *Oldtown Folks*, *Dred* and *My Wife and I*.

STRABISMUS, *stra biz'mus*. See SQUINTING.

STRABO (about 64 B. C.-about A. D. 19), a Greek geographer and historian, a native of Pontus and a resident of Rome after his thirty-fifth year. His earliest writing was his *History*, of which but a few fragments remain. His great work, however, a geography, in seventeen books, has been preserved entire, with the exception of the seventh book, of which there is only an epitome. The first two books are introductory, the next eight treat of Europe, the six following treat of Asia and the last discusses Africa. This is the most important geographical work that has come down from antiquity.

STRADIVARIUS, *strah de vah're us*, ANTONIO (1649-1737), a celebrated violin maker, born in Cremona, Italy. He was a pupil of Nicolo Amati, in whose employment he remained until 1700, when he began making violins on his own account. It was he who settled the typical pattern of the Cremona violin, and his instruments, for tone and finish, have never been excelled.

STRAFFORD, THOMAS WENTWORTH, Earl of (1593-1641), an English statesman. He sat in Parliament for Yorkshire for a number of years and in the first Parliament of Charles I strongly opposed the royal aggressions. In 1628, he supported the Petition of Right. As he felt, however, that Parliament was going too far in its opposition to the king, he went over to the king's side, was made baron, then viscount and president of the Council of the North and privy counselor. In 1633 he went to Ireland as lord deputy and attempted to impress his system of "thorough," by which he meant thorough devotion to the interests of the king. Although Ireland was commercially and industrially the better for his rule, the despotism employed in putting his system into practice made him exceedingly unpopular.

After his return to England in 1639 Wentworth was made Earl of Strafford and became even more powerful in the king's council. When the Scots rebelled against the king, Strafford went to Ireland to raise an army, to help put down the insurrection, and this act was later used against him in his impeachment. One of the first acts of the Long Parliament was the impeachment of Strafford. It became plain that the House of Lords was not likely to render judgment against him, and the Commons were therefore obliged to change their proceedings to a bill of attainder. This was passed by both houses, and Charles I, despite the fact that he had promised that Strafford should come to no harm, was forced to sign it. Strafford was beheaded in May, 1641.

STRAITS SETTLEMENTS, a British colonial settlement comprising the southern part of the Malay Peninsula and some of the adjacent islands. It includes the settlements of Singapore Island, Penang and Malacca, on the peninsula. The total area is about 1,600 square miles. The population is approximately 760,000; of these, 8,000 are whites, and the remainder are Chinese, Malays and natives of India. The chief ports

are Singapore, on the island of the same name, and Georgetown, on the island of Penang. Through them pass quantities of coffee, rubber, gum, spices, tin and rattan. Singapore (which see) is the capital.

STRAMONIUM, also called **JIMSON WEED** and **STINK WEED**, a poisonous herb of the nightshade family, which grows to the height of from three to five feet. It has an erect stem, numerous branches, large, triangular leaves, and long, fringed, trumpet-shaped white flowers. Green burs enclose small, dark, wrinkled seeds. Both leaves and seeds are used in making the drug stramonium, which is similar to belladonna and is used to relieve asthma. See **NIGHTSHADE**.

STRASSBURG, *strahs'boorK*, FRANCE, the capital of Alsace-Lorraine, is situated on the Ill River, 300 miles east by south of Paris and about 370 miles southwest of Berlin. It is one of the most strongly fortified towns in the world, and is practically encircled by forts and ramparts. For centuries the city has been noted for its cathedral, the oldest part of which dates from the beginning of the eleventh century, and which was completed in the fifteenth century. In the tower is the famous Strassburg clock (which see). Other buildings of note are the Church of Saint Thomas; the municipal museum of art, which was formerly an episcopal palace, and the imperial palace. The leading educational institution is the University of Strassburg. Its library contains over 1,000,000 volumes, and in addition there is a municipal library of over 115,000 volumes. The city is connected with the Rhine by canals, and it also has communication with a number of the waterways of France. The industrial establishments include tobacco and cigar factories, organ works, machine shops, printing houses, tanneries and foundries.

Strassburg is supposed to have been founded by the Romans, who named it *Argentoratum*. In the sixth century its name was changed to Strassburg, and in the beginning of the tenth century it came under the control of the German emperors. It was united with France in 1861, but at the close of the Franco-German War, along with Alsace-Lorraine it became a part of the German Empire. In 1918 it again reverted to France (see **WORLD WAR**). Population, 1921, 166,767.

STRASSBURG CLOCK, the famous clock in the tower of the Strassburg Cathedral.

The present one is the third to acquire fame. The first was built in 1352; the second in 1570. The last, made early in the nineteenth century, is thirty feet high, and fifteen feet wide at the base. At the bottom is a large globe of the heavens, which shows the course of the stars and the passing of each important one across the meridian of Strassburg. Behind this globe is a calendar, which shows the day of the month and the occurrence of all the religious festivals. Next above the dial is a planetarium, and above this is a globe which shows the phases of the moon. On the next floor are several figures, which strike the quarter hours. These represent the different periods of life—infancy, youth, old age and death. Above all is a figure of Christ. At noon on each day, the twelve apostles pass before him in procession, and at the same time a cock appears and crows three times. See **STRASSBURG**.

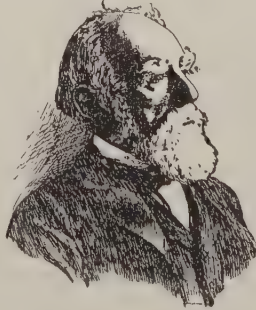
STRATEGY, *strat'e ji*, the art of planning a military movement in a way to give an army every possible advantage over the enemy. It is to be distinguished from *tactics*, which have to do with the actual business of fighting. When in the summer of 1914 the Germans lured the Russian army into the marshy region of the Masurian Lakes in Northern Poland, they executed a strategic campaign which resulted in one of their notable victories. This was one of the few conspicuous strategic feats of the World War. In fact, in modern warfare the opportunities for the exercise of strategy are rare. Formerly, when wars consisted of campaigns and when armies played hide and seek chasing each other over extensive areas of territory and engaging in occasional battles, success depended as much on strategy as upon man power and equipment. To-day it is becoming a less important factor. When opposing armies meet along a front hundreds of miles in extent they come to a standstill. The points of advantage are seen from both sides, and the efforts to gain them are tactical rather than strategic.

STRATFORD, ONT., the county seat of Perth County, situated on the Avon River and on six lines of the Canadian National Ry., eighty-eight miles west of Toronto. It is quite an important industrial center, having about sixty manufacturing enterprises, among them being foundries and machine shops, railroad shops, wire fence works, chemical works, woolen factories, hosiery fac-

ories, and a boot and shoe factory. Population, 1911, 12,946; in 1921, 16,064.

STRATFORD-UPON-AVON, ENGLAND, a municipal borough, famous as the birth-place of Shakespeare, situated eight miles southwest of Warwick. The town is characterized by broad streets and old wooden houses. It contains the parish church, in which Shakespeare lies buried, and the house in which he was born, and in which are preserved portraits, early editions and other objects of interest related to the poet. The Shakespeare Memorial Building, including a theater, the old Guild Hall and the Shakespeare Monument, are other objects of interest. Anne Hathaway's cottage is about one mile west of the town. Population, 1911, 8,500.

STRATHCONA AND MOUNT ROYAL, DONALD ALEXANDER SMITH, Baron (1820-1914), a Canadian statesman and financier, was born at Forres, Scotland. In 1838 he was appointed a junior clerk in the Hudson's Bay Company. For thirteen years he was stationed at Hamilton Inlet, Labrador; here, besides mastering the fur trade, he spent much of his time in introducing improvements into the conditions of life, being the first to



LORD STRATHCONA

prove that potatoes could be grown there with success. Then for ten years he was on Hudson Bay, where he rose to be a chief trader and later chief factor; and in 1868 he became resident governor at Montreal. During the disorders in 1870 in the Red River settlements he used his influence in settling the disputes without bloodshed. He was elected to the first legislative assembly of the new province of Manitoba and then to the House of Commons. In Parliament he was prominent for his independence and his advocacy of railroad expansion. Together with his cousin, Lord Mount Stephen, he was one of the organizers of the present Canadian Pacific Railway, and it is largely due to his energy and ability that the project was completed. Except from 1882 to 1887 he continued to sit in Parliament until 1896, when he succeeded Sir Charles Tupper as

high commissioner in London. Smith was raised to the peerage in 1897. He received numerous honorary degrees from colleges and universities and for many years was chancellor of Aberdeen and McGill universities.

STRATIFIED ROCKS, rocks which are composed of several layers, or *strata*, formed by the slow hardening of mud. When the earth was young these strata lay horizontally, but with the wrinkling of the crust the strata became folded, and in some places they have cropped out and become visible. Strata that do not lie horizontally are said to *dip*, and the angle of inclination is called the *angle of the dip*.

STRAUSS, JOHANN (1825-1899), an Austrian composer known as the "Waltz King." He was born at Vienna, the son of Johann Strauss, also a well-known composer of waltz music. At the age of nineteen he began conducting a small restaurant orchestra, and afterwards, with a larger orchestra, he toured Europe, everywhere winning applause for his artistic dance music. In 1855 he conducted summer concerts at the Russian capital, and in 1863 became conductor of the Russian court balls. He wrote more than four hundred waltzes, many of them world-famous, especially *The Beautiful Blue Danube*, *Artist's Life and Wine*, *Woman and Song*.

STRAUSS, RICHARD (1864-), a German composer and conductor, the most distinguished representative of the school of music founded by Richard Wagner. He was born at Munich, and with extraordinary precocity, at the age of six wrote music good enough to publish. While still in his teens he wrote *Symphony in D Minor* as well as numerous songs and instrumental pieces, gaining a wide popularity. He is especially noted for his descriptive pieces, or "tone poems," including *Till Eulenspiegel*, *Don Quixote* and *Domestic Symphony*, in which melody is sacrificed for the sake of realistic effect. His operas *Elektra* and *Salome* have provoked much criticism because of their stark realism. Of all the songs written in the last few decades none are more popular than those of Strauss. They are rich in melody, sentiment and color.

STRAW, the dried stems of certain plants. It is used in the manufacture of mats, coarse cloths, paper and various other articles, and it is also employed for fodder and bedding for animals. It is principally used in the

manufacture of hats, an industry extensively carried on in France, Italy, Switzerland, Austria, Germany, Bohemia and China. In America the center of the hat industry is Massachusetts. The straw most used for hats is wheat. The stalks are pulled up, cut in pieces, bleached and then woven into the desired shapes.

STRAWBERRY, *straw'ber i*, a small plant of the rose family which produces a delicious red fruit also called strawberry. In the technical sense, the strawberry cannot be classified as a berry, for, unlike the currant and the gooseberry, it has no outer skin enclosing pulp and seed, the tiny yellow seeds lying in little pits on the surface. It is heart-shaped and juicy, with a delicate perfume and rich flavor. It is a favorite fruit in many countries and is widely cultivated. The plant is hardy, and in America can be made to grow and produce from Florida to Alaska, though it thrives best in the middle latitudes, at about the fortieth parallel. Maryland is the foremost strawberry-producing state, New Jersey, New York, California, Missouri and Michigan following in the order named. Ontario, producing eleven million quarts annually, compares not unfavorably with Michigan, which has an output of fourteen millions.

The cultivation of the strawberry is not difficult, if a few essentials are regarded. The plants, which are small, seldom more than five inches high, send out runners or vines, which creep along the ground and at intervals take root. The young plants obtained from the rooted runners are the most productive. They are transplanted in late autumn or spring in rows or hills three or four feet apart, with fifteen inches separating the plants. As they grow they send out runners, which may be cut off or allowed to mat, the former treatment resulting in less numerous berries but larger ones. The richer the soil the better, and it should have been under cultivation at least two seasons. Success with strawberries means crop rotation, and when the bearing season is over the beds should be plowed under and planted to something else for two or three years before strawberries are again planted.

When the plants are set out in the fall they should be mulched with straw. This should be raked between the rows but left around the plants, as it keeps the berries off the

ground. To prepare soil for spring planting, drain thoroughly and cover with manure. In the spring rake off all trash and work the soil until it is light to a depth of six inches. A good fertilizer, such as nitrate of soda, applied just before the blossoming, increases the crop. The plants require a great deal of moisture, and sometimes require irrigation.

The strawberry plant is attacked by several insects and is subject to blight or rust, which appears on the leaves as purple spots. As this disease may be carried over the winter all foliage should be burned and the young plants sprayed with Bordeaux mixture. Strawberries should never be planted after grass, for the field is certain in such case to contain grubs. The strawberry weevil, which attacks buds and blossoms, can be checked by spraying with white hellebore and kerosene emulsion; and the latter preparation will also destroy the yellow caterpillars that sometimes infest the plants.

STREATOR, *street'or*, ILL., a city in La Salle County, ninety miles southwest of Chicago, on the Vermilion River and on the Atchison, Topeka & Santa Fé, the Chicago & Alton, the Chicago, Burlington & Quincy, the Wabash, the New York Central and the Chicago, Ottawa & Peoria railroads. It is situated in an agricultural section and is also near deposits of coal, fire clay and building stone. The leading industrial establishments are glass works, foundries, machine shops, car shops, automobile factories and brick and tile works. Streator is built on a bluff along the river. There are a Federal building and a Carnegie Library. The place was settled in 1860 and was chartered as a city in 1882. Population, 1910, 14,253; in 1920, 14,779, a gain of 4 per cent.

STREET RAILWAY. The street railway is an American idea, although it was developed from the English tramway. Throughout Europe street railways are called *trams*. The first street railway was laid in New York City, from the Bowery to Harlem, in 1831 and 1832. The car used was an old-fashioned stagecoach, and it was hauled by horses. Afterwards steam power was tried, but it was not successful, and the horses were reinstated. The success of this line led to the construction of others in New York and other cities, and before 1860 street railways were common in all large cities of the United States. Since that time they have been extended throughout Europe.

For a long time horses were the only motive power used in operating the cars. Several attempts to use steam were made, but none was successful. In 1873 the cable as a motive power was introduced in San Francisco. An endless cable was wound around a drum by a stationary engine; the cable passed under the middle of the car track, and the motor car, called the *grip car*, was attached to it by a grappling device operated by levers. Cable cars were introduced in several large cities, and were successful, but the invention of an electric motor that could be successfully used on street cars soon caused all cable systems to be replaced by electric cars, and now electricity is practically the only power used in operating street railways. See ELECTRIC RAILWAY.

STRENGTH OF MATERIAL, the term used to express the resistance offered by any building material to a force that tends to change its shape. Materials are subject to several kinds of stress, the chief of which are the stress of direct pull, or *tensile* stress; the stress of pushing together, or *compressive* stress; the stress of tending to slide on parallel surfaces, or *shearing* stress; and the *twisting*, or *torsion* stress, illustrated by a shaft to which a crank is attached. All other forms of strain are combinations of these.

Materials vary greatly in their strength, and different samples of the same material, as white pine, may show a marked variation in strength. For this reason engineers re-

quire that the material they are to use in any large structure be carefully tested before it is accepted. Most ingenious machines for testing the strength of materials have been constructed, and the strain applied is that to which the material will be most subjected. A given unit, which in English-speaking

countries is the square inch (in countries where the metric system is in use, the square centimeter) is employed in making the test. For instance, a rod of oak one inch square has a tensile stress of 12,000 pounds, and one of white pine a stress of 8,000 pounds. The stress on this area is called the *unit of stress*. The *ultimate strength* of the material is the unit of stress reached just before rupture takes place. The ultimate strength is from two to four times as great as the stress of the unit before it begins to change form.

To find the tensile strength of any material a specimen one inch square and eight inches long is pulled apart. The load is applied gradually and each addition to the load produces a proportionate increase in length in the specimen until a point is reached where the elongation increases more rapidly than the load. The stress at this point is called the *elastic limit* of the material. Wrought iron and steel offer the greatest resistance to tensile strains; the strength of wood in this direction varies according to its seasoning and specific gravity. The heavier the wood is, in general, the stronger it is. The transverse strength of beams is determined largely by their elasticity. The property varies greatly in different materials. Wood has a greater elastic range of action than iron or steel bars and it consequently sinks or deflects to a greater degree under a given weight. Any strain beyond the *elastic limit* entails fracture. Increased stiffness or transverse resistance of beams is rapidly ob-

MATERIAL	TENSILE STRENGTH		CRUSHING STRENGTH		SHEARING STRENGTH	
	ULTIMATE	ELASTIC	ULTIMATE	ELASTIC	ULTIMATE	ELASTIC
Cast iron... {from	30,500	Indefinite	130,000	Indefinite	12,000	Indefinite
{to	10,800	Indefinite	50,000	Indefinite	8,700	Indefinite
Wrought iron bars... {from	67,000	30,000	50,000	30,000	49,000	22,000
{to	33,500	(average)	(average)	(average)	22,400	(average)
Steel plates... {from	65,000	42,000	.....	38,000	50,000	.....
{to	110,000	67,000	.....	71,000	83,000	.....
Steel boiler plates	66,000	36,000	.....	.....	56,000	.....
Rivet steel.	65,000	46,000	.....	.....	55,600	.....
Copper, rolled plates	.....	5,600	.....	4,000	.....	3,000
Copper, annealed wire	31,000	.....	.....	.....	.....	.....
Brass	45,000	.....	.....	.....	.....	.....
Cast zinc	17,500	.....	.....	.....	.....	.....
	29,000	.....	.....	.....	.....	.....
	7,500	3,200	.....	.....	.....	.....

quire that the material they are to use in any large structure be carefully tested before it is accepted. Most ingenious machines for testing the strength of materials have been constructed, and the strain applied is that to which the material will be most subjected. A given unit, which in English-speaking

tained with an increase of depth of the beam. With the exception of wood, materials offer a greater resistance to a crushing force than to a tensile strain. Cast iron is superior to wrought iron in this respect and is consequently much employed in the construction of foundations. Torsional stress tries the

solidity and tenacity of metals more than any other kind of stress. But the torsional strength of shafts increases very rapidly as the diameter is enlarged. The distribution of material in hollow forms conduces to the greatest strength and stiffness, in combination with the minimum consumption of material. A familiar instance of the hollow construction is the stem of grasses, and especially the bamboo, while another example is that of the hollow bones of animals.

The table from Unwin, on page 3450, is valuable for reference.

STRIKE, an action taken by workmen in any branch of industry when they cease from work, with the object of compelling their employers to accede to certain demands made by them. The strike is distinguished from a *lockout*, which is the retaliatory measure adopted by employers to resist such demands by stopping the operation of their plants and throwing their workmen out of employment.

During the World War labor supported the governments of leading countries, coöperating in almost every instance to meet pressing wartime emergencies. After the cessation of hostilities, due to general unrest all over the world and prevailing economic, rather than political conditions, labor again took recourse to its weapons of strikes on a stupendous scale. Although there are many agitators in the ranks, a major portion of labor is loyal to democratic principles and does not countenance bickerings or strikes; is more than ready to coöperate with capital for the general good of all. See **LABOR ORGANIZATIONS**.

STRINDBERG, AUGUST (1849-1912), one of the foremost Swedish writers of his time, the author of dramas, novels, lectures and numerous other literary forms in which he showed himself in turn romanticist, naturalist, mystic and skeptic. Strindberg was born at Stockholm, the son of an obscure tradesman and a barmaid. He attended the University of Upsala, and after trying his hand at school teaching, tutoring and journalism, he procured a post in the Royal Library, Stockholm. He was a zealous supporter of the theory that woman is inferior to man, mentally and morally as well as physically. He was three times married and three times divorced. His first important play, *Master Olof*, was produced in 1878. This was followed by *The Red Room*, *The Bondswoman's Son*, *The Author*, *A Fool's Confession* (auto-

biographic), *Inferno* and *Legends*. *The Natives of Hemsö* is a brilliant novel of Swedish peasant life. *Utopias Realized* is a defense of socialism. Notable among his plays are *Gustavus Adolphus*, *The Father* and *Lucky Pehr*.

STRONTIUM, *stron'sheum*, a yellowish metallic element, first observed in the lead mines of Strontium, Argyllshire, Scotland, and separated from its compounds by Davy in 1808. Though less abundant than barium, it occurs in nature in similar forms of combination. It is malleable and ductile, and burns with a crimson flame when heated in air. Strontium is used in extracting beet sugar. The nitrate made from it is used in the manufacture of fireworks.

STRYCHNINE, *strik'nin*, a poisonous drug obtained from the seeds of *nux vomica* and certain other plants. It is prepared in the form of crystals, which are odorless but intensely bitter. One-eighth of a grain of strychnine will kill a large dog; three-eighths of a grain will produce spasms in man. A half grain is sometimes fatal to man, a whole grain almost always so. The symptoms of strychnine poisoning are difficulty in breathing, followed by twitching of the limbs and convulsions, in which the body becomes rigid and is often bent strongly backward. In very small doses—from one-fifteenth to one-fiftieth of a grain—strychnine is valuable as a tonic.

STRYCHNOS, *strik'nos*, the botanical name of a genus of shrubs or trees, which are found principally in the tropical parts of Asia and America. The plants have leathery leaves and dense clusters of white, valve-shaped flowers. Some of the most powerful drugs are produced from plants of the genus, among them strychnine and *nux vomica* (which see).

STU'ART, or **STEW'ART**, a royal family of England and Scotland. The founder of the house seems to have been a Norman baron named Fitzdaald, a follower of William the Conqueror, whose second son, Walter, entered the service of David I of Scotland and became steward of the royal household. The name of the office was adopted by the family as a surname. Walter obtained large grants of land from David. James, the fifth steward, was chosen as one of the regents, on the death of Alexander III, and died in the service of Bruce in 1309. His son, Walter, the sixth steward, married Marjory, daughter of

King Robert I, a union which secured to his family the crown of Scotland in the event of the extinction of the royal line. Walter died in 1326 and was succeeded by his son Robert, who, on the death of David II without issue succeeded to the crown as Robert II. With James VI of Scotland, son of Mary Queen of Scots, the Stuart family succeeded to the throne of England. (For its history subsequent to this time see JAMES I; CHARLES I; CHARLES II; JAMES II; MARY II; ANNE.) James II was driven from the throne of England, and for years there was a struggle to replace the Stuarts on the throne. Mary of Modena, second wife of James II of England, gave birth to James Edward, commonly called the Old Pretender (see STUART, JAMES EDWARD). In 1715 an unsuccessful attempt was made by the Jacobites, or Stuart party, to set this prince on the throne of his ancestors by force of arms. He married a granddaughter of John Sobieski, king of Poland, by whom he had two sons, Charles Edward, the Young Pretender, and Henry Benedict Maria Clement, who became a cardinal in 1747.

STUART, CHARLES EDWARD, called *The Young Pretender* (1720–1788), eldest son of James Edward Stuart, the Old Pretender. He was promised aid by France in an invasion of Great Britain, and accordingly in 1745 he landed in Scotland. With the help of the Scotch Highlanders, who joined him promptly, he won a victory over the royal forces, but when he entered England he found little support and was finally obliged to retreat without attempting to enter London. At Culloden in 1746, he was completely defeated by the Duke of Cumberland, and for five months he remained hidden in various places in the Scotch Highlands and in the Hebrides, protected by the loyalty of the Scotch. He finally escaped to the Continent, where he passed the remainder of his life.

STUART, GILBERT (1755–1828), an American painter, noted for his portraits of famous Americans. He was born in Narragansett, R. I. In 1775 he went to London, where he had his first instruction under good masters. There he remained until 1792, and during the last part of his stay his genius was fully recognized. In 1795 he painted the first of about forty portraits of Washington on which, more than on any of his other work, his fame rests. These portraits are too much idealized to be faithful likenesses

of the first President, but they represent him as the world likes to think of him and so are the most popular of all Washington portraits. Among Stuart's other sitters were John Adams, Jefferson, Madison, Monroe, John Jay, John Jacob Astor, William Ellery Channing and Josiah Quincy. See WASHINGTON, GEORGE, *portrait*.

STUART, JAMES EDWARD, called *Chevalier Saint George*, or *The Old Pretender* (1688–1766), son of James II of England and Mary of Modena, his second wife. He was born a short time before his father was deposed; in fact, his birth and the fear that on his accession England would become permanently a Catholic country, had much to do with the overthrow of James. In 1715 an unsuccessful attempt was made by the Jacobites to secure the throne for him. The remainder of his life was spent mostly in Rome. His wife was a granddaughter of John Sobieski of Poland.

STUART, JAMES EWELL BROWN (1833–1864), an American general, born in Patrick County, Va. He was graduated at the United States Military Academy in 1854 and was promoted rapidly in the army. When Virginia seceded, he was made lieutenant-colonel of Virginia troops, and commanded the Confederate cavalry in the first Battle of Bull Run. Later in the same year he became a brigadier-general. In June, 1862, he conducted a daring reconnoissance of McClellan's army on the Chickahominy, fought at the second Battle of Bull Run, led the advance of Jackson's Maryland invasion and fought at South Mountain, Antietam and Fredericksburg. After the fall of Stonewall Jackson, Stuart succeeded to the temporary command of Jackson's corps at Chancellorsville. In the campaign of 1864 he was mortally wounded at Yellow Tavern, near Richmond, where he attempted to check Sheridan's advance.

STUART, RUTH McENERY (1856–1917), an American story writer, born in Avoyelles parish, La., and educated at Tulane University. She married Alfred O. Stuart, a cotton planter, in 1879, and after 1885 made her home in New York. The original humor of her negro sketches give them a foremost place among stories of their kind. Her writings include *George Washington Jones*, *The Story of Babette*, *The Women's Exchange*, *Sonny*, *The River's Children*, *Amity's Silver Wedding* and *Sonny's Father*.

STUC'CO, a fine plaster, used as a coating for walls, to give them a finished surface. The stucco used for interior decorations is made of pulverized white marble, mixed with water, or of calcined gypsum or plaster of Paris, mixed with glue. That used for external purposes is of a coarser kind prepared with cement. A cheap plaster used for the outside of temporary buildings is called *staff*. The Greeks and Romans used stucco to a great extent, both for internal and external decoration in their buildings, often moulding it into relief designs for friezes and such details.

STURGEON, *stur'jun*, a group of fishes comprising numerous species, found in both fresh and salt waters of the north temperate zone. Some of them are very large, being



STURGEON

ten feet long and weighing approximately 500 pounds. The body is long and slender, terminating in a forked tail, and covered with rows of bony plates. The mouth is comparatively small, funnel-shaped and toothless, and the food, consisting of small marine animals and vegetable growths, is sucked in whole through the thick lips under the long, pointed snout.

The sturgeon is important in the fishing industry. The flesh, which is well flavored, is usually smoked for the market; the eggs are used in the preparation of caviar, and the bladder of the Russian sturgeon is used in making isinglass. Of the numerous species, one of the most familiar is the *common sturgeon*, found in European waters and along the Atlantic coast of North America from Maine to South Carolina. These fish ascend streams in the spawning season and are easily caught, consequently they are not so numerous as formerly. Other species are the *lake sturgeon* of the Great Lakes and Middle West streams; the *white sturgeon* of the Pacific coast of America, the *Russian sterlet* and the *Russian beluga*, the last an enormous fish sometimes weighing 3,000 pounds.

STURM, *stoorm*, JOHANNES (1507-1589), a celebrated educator, born at Schleiden, Prussia. He began teaching at Louvain, afterwards went to Paris, and was then appointed director of the gymnasium at Strassburg, which position he occupied for forty

years. It was in connection with this school that Sturm gained his wide reputation as an educator and reformer. He organized the gymnasium into twelve classes, or grades, extending from the lowest primary to the college, and each of these classes had the work so planned that it prepared for the one next higher. His methods of teaching were clear, practical and forceful, and his course of study was so well planned that the pupils in his school made remarkable progress. The work attracted the attention of educators in every country of Europe, and from Germany the system was transferred to England and was the basis of organization of such schools as Eton and Rugby. From England Sturm's influence extended to America. He is justly considered the originator of what has developed into the graded school system.

STUTTGART, *stoot'gahrt*, GERMANY, the capital of the former kingdom of Württemberg, is situated near the left bank of the Neckar, 115 miles northwest of Munich and thirty-eight miles southeast of Carlsruhe. The surrounding country is exceptionally beautiful, and the city is noted for its broad streets, spacious squares and fine buildings. The most noted structures are the former palace of the king; the old palace, dating from the sixteenth century; the royal library, which has over 400,000 volumes; the Stiftskirche, which dates from the twelfth century, and a Jewish synagogue. The city buildings consist of the industrial museum, the townhall, the hall for the choral society, the art museum, the palace of justice and the polytechnic institute. The educational institutions include a conservatory of music, an academy of fine arts, a veterinary college and a cabinet of natural history. Among the leading industries are the manufactures of textiles, chemicals, furniture, paper, pianos and chocolate. The city is, next to Leipzig, the greatest center of the German book trade. **PETER STUYVESANT** Population, 1918, 349,564.



STUYVESANT, *sti've sant*, PETER (1592-1672), a Dutch governor of New Netherlands

(New York), was born in Holland. In 1647 he was made director-general of the colony of the New Netherlands, a position he held until 1664, displaying noteworthy ability and energy in organization and administration. In 1664 the colony fell into the hands of the English and became known as New York. Stuyvesant went to Holland the next year, but soon returned and passed the rest of his life on his farm, called Bouwerij, from which the present Bowery in the city of New York is named.

STYPTIC, *stiptik*, any substance used in surgery to check the flow of blood from a surface or an orifice. The principal styptics are tannic acid, alum, copper, salts of iron and zinc.

STYX, in Greek and Roman mythology, the name of a river of the lower world, over which the dead were ferried by Charon. Styx was also a rivulet in Arcadia, the water of which was considered poisonous.

SUBMARINE, the boat that Sir Percy Scott of the British navy said would eliminate the battleship, is a boat that travels under water. Before the World War the submarine had received but little consideration, although a few of these boats formed a part of the navies of the principal nations. But within two years from the beginning of the war, the submarine was regarded as the greatest terror of the seas and one of the decisive factors in the conflict.

General Description. A submarine is a steel shell resembling in shape a huge cigar. When floating at the surface it shows an oval back that rises about two and a half feet above the water. Modern submarines are divided into two classes, called coastal and fleet submarines. The general plan of construction is the same for each class, but the fleet submarines are much larger. Coastal submarines are designed for coast defense and are from 150 to 200 feet long, and from fifteen to twenty feet beam. When submerged they displace a quantity of water weighing from 250 to 600 tons. Fleet submarines are designed for longer voyages. They vary in length from 225 to 400 feet, and have a displacement when submerged of 800 to 1,200 tons.

The shell is made of steel plates riveted to a strong steel frame. In the bottom of the boat are a number of compartments which are filled with water when the boat is to submerge. A conning tower rises from the center

of the boat to a height of four or more feet. Such a tower is provided with windows of thick glass, and serves as the bridge for operating the boat. A steering rudder is attached to the stern, and dividing rudders called *hydroplanes* are attached to each side near the bow and stern. These rudders can be inclined



ONLY THE PERISCOPE
upward or down-
ward, and they direct
In time of war the flag
is absent.
the boat in diving and rising to the surface. In front of the conning tower is the periscope, which is the "eye of the ship." The speed of a submarine at the surface is from seventeen to twenty-two miles an hour, and when submerged, from nine to eighteen miles.

Equipment. The naval submarine is designed for sinking ships by the means of torpedoes, and the equipment is all planned to this end. The interior is divided into a number of compartments—one is for officers' quarters and another for the men. A number of seamless steel tanks contain air under great pressure, sometimes as high as 2,500 pounds to the square inch. This air is used for forcing water out of the tanks when the boat is to rise to the surface, and for supplying air to the crew. The motors are in the stern, and there is one for each propeller.

When afloat the boat is propelled by an engine which uses crude oil for fuel, and



SUBMARINE, UP FOR AIR

when submerged it is driven through the water by an electric motor that receives its current from storage batteries. The steering gear is similar to that on other ships. On small boats it is operated by hand, but on large ones electric power is used.

The Periscope. The periscope is in front of the conning tower and consists of a tube that can be extended upward about twenty feet, and lowered as the boat nears the surface. A lens fixed in the tube near the top throws a picture of the sea within its field

upon a prism which reflects it down to another prism at the bottom of the tube, where the commanding officer can see it through a glass that closely resembles a field glass. The combination of prisms and lenses is such that the view obtained enables the observer to judge accurately of the location and distance of objects. The entire apparatus can be rotated, so that a view in any direction may be readily obtained. Each modern submarine is provided with two periscopes, one for the commander and one for the helmsman. The gyro-compass shows the direction the boat is taking. This compass consists of a small gyroscope (which see), so mounted that it moves freely on a vertical pivot. The gyroscope when undisturbed will rotate in a plane parallel to the earth's axis; consequently it points directly north and south. The magnetic compass cannot be used because the steel of the ship and the electric currents deflect the needle from its course.

Torpedo Tubes. The torpedo tubes might be called the guns from which the torpedoes are fired. They are usually placed in the upper part of the bow, but they may be placed in the stern or amidships. The outer end of the tube is closed with a water-tight cap which can be opened and closed by a mechanism within the boat. The torpedo is fired by compressed air. The number of tubes a boat can carry depends upon its size. The smallest boats can carry only two. One or more guns for repelling attacks or for attacking also form a part of the equipment.

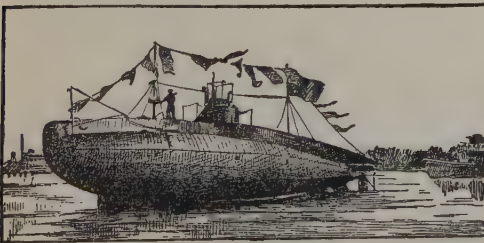
Safety Devices. Each member of the crew is supplied with a safety helmet similar to that used by divers, by means of which he can breathe under water for several hours. Air locks enable men trapped in a damaged compartment to escape to one that is not dam-

sage keel consisting of a keel twelve inches deep, twenty-four inches wide and having a length determined by the weight desired is attached to the boat amid ships. The keel is made of steel plates and is filled with lead. It weighs from five to twenty tons, and is attached to the boat by a device by which it can be instantly released in case of accident. Its release enables the boat to ascend to the surface instantly. In short, all possible precautions are taken for the safety of officers and men, but at best the navigation of a submarine is exceedingly dangerous.

Operation. When a submarine is ready to submerge the tanks are filled, and the boat settles in the water until only the conning tower remains above the surface. The diving rudders are tilted at a slight angle and the motor is started. As the boat moves forward it moves downward. When the desired depth is reached, the diving rudders are changed to a horizontal position and the boat moves through the water at that level. When searching for hostile ships the periscope is kept four or five feet above the water, and if other ships are near, the submarine must move very slowly or the wave caused by the periscope will reveal its location to the enemy. As the ship to be destroyed is approached, a torpedo is placed in the tube, and when the commander has brought his boat into the right position he presses a button and the torpedo is launched.

When a submarine discovers an airplane or a destroyer approaching, it immediately dives to a depth which will assure its safety. The destroyer, which is a swift boat of light draught, armed with rapid-fire guns, whose shells can penetrate its armor, is the enemy most feared by the submarine, for a single shot that pierces the armor is likely to send the boat to the bottom. The small submarines have a steaming radius of about 700 miles; larger boats can travel 5,000 miles from their base.

The Submarine in the World War. Details of the work of the submarine in the World War will be found in the article WORLD WAR. It was this war that revealed the power of the submarine as an instrument of destruction, but the war also showed that the submarine was not invincible. That these boats were the only branch of the German navy that was effective during the war, and that they inflicted great loss on the shipping of the allies and on that of neutral na-



LAUNCHING OF THE CUTTLE FISH, U. S. N. aged, and each compartment is provided with an escape hatch. All pumping systems for air and water are duplicated, so that if one is injured another can take its place. A

tions is true. But, with all their power for destruction, they were unable to prevent the British navy from keeping the German fleet shut up in the Baltic Sea, thus rendering it wholly ineffective during the entire period of the conflict. For a few months, following Germany's order to sink without warning all ships bound to or from the ports of the allies, large numbers of ships were destroyed, but as soon as England and America were able to put on the seas great fleets of destroyers, the activity of the submarines was checked, and during the last months of the war they accomplished little.

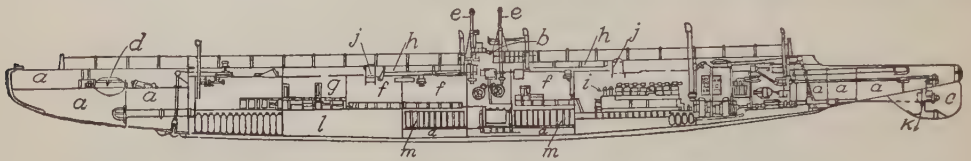
Great Britain, France and the United States all had fleets of submarines, but since

of different navies differ in minor points, they all embody the main features of Holland's design. During the World War the Germans constructed two large submarines for commercial purposes, one of which, the *Deutschland*, made two successful voyages to the United States.

Related Articles. Consult the following titles for additional information:

Submarine Mine	Torpedo Boat
Torpedo	World War

SUBMARINE MINE, one of the most dangerous and destructive weapons employed in naval warfare, consists of a steel shell charged with a powerful explosive and containing a device for exploding the charge. Submarine mines are so placed in water as to



SUBMARINE

(a) Ballast tanks
(b) Conning tower
(c) Rudder
(d) Diving rudder
(hydroplane)

(e) Periscope
(f) Crew quarters
(g) Officer's quarters
(h) Torpedo tubes
(i) Engines

(j) Escape hatches
(k) Propeller
(l) Oil tank for fuel
(m) Storage battery

the shipping of the Central Powers was driven from the seas, there were no ships for these boats to attack, and because of this they were not brought prominently before the public. They were invaluable, however, for hunting and attacking submarines of the enemy in all seas surrounding Europe.

History. During the eighteenth and the early part of the nineteenth century there were several attempts to construct a submarine boat. In 1800 Robert Fulton, then in France, built a number of submarine boats, but they were not practical. During the Civil War the Confederates used a number of submarines propelled by steam engines, as well as some by hand. These boats, called *Dauids*, from their smallness as compared to the ships they attacked, were made of old boiler plates, and when advancing to the attack, the top was just under the surface of the water.

The submarine in its present form is the invention of John P. Holland of Paterson, N. J., whose first boat was built in 1877. A Swedish inventor, Nordenfelt, constructed a boat somewhat similar to Holland's in 1866. Both patterns were submitted to the United States government for approval and Holland's was adopted. Although the submarines

destroy or injure any ship which comes in contact with them. Guncotton, which is not injured by water, is the explosive used.

Mines are of three kinds—observation, electro-contact and automatic. Observation mines are placed in harbors or near the shore, and the operator, by switching on an electric current, can explode the mine or group of mines nearest the attacking vessel. Electro-contact mines are constructed in such a way that when they are suddenly tipped to an angle of over 70° a small quantity of mercury is released to complete the circuit between two wires, and the mine explodes. In observation mines no electric current flows until the operator turns the switch; in the electro-contact mines the current is always flowing, but the circuit is not completed until the mine is suddenly hit and tipped over. Both observation mines and electro-contact mines must be anchored so that they are from 5 to 20 feet below the surface of the water. The third class of mines is the automatic, which are just like the electro-contact variety except that the electric current is furnished by dry cells inside the mine. Automatic mines are the only ones which can be used at any distance from shore. They may

be anchored or allowed to drift. In the latter case, they are called *floating* mines.

Mine-Laying. Mines have to be placed with great care, if they are to be effective. Each mine must be located where ships will be most likely to come in contact with it, and its depth must be accurately calculated. Laying the cables to mines that are exploded by batteries on shore is also a delicate operation. The wires connecting the mine with the battery must be strong enough to anchor the mine and of sufficient length to keep the mine at such a depth that it will not be hit by vessels entering or leaving the harbor.

Mine Sweeping. Various devices have been invented for locating and removing mines. Whatever the method employed, ships engaged in this work incur great danger. Figure 1 shows the method in general use previous to 1917. Two vessels are connected by a heavily-weighted cable, which they drag between them. The mines caught by the cable

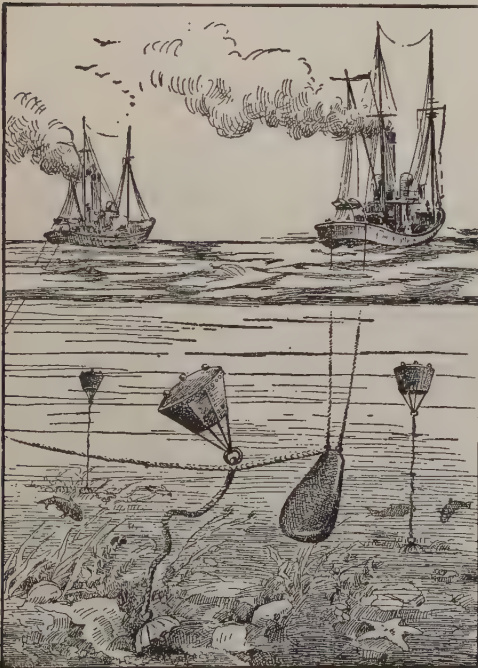


FIG. 1.—“SWEEPING” FOR MINES
Showing the method by which mines may be removed.

are destroyed. Another method of rendering mined waters safe is countermining, that is, by exploding mines in the suspected area. The explosion causes all previously laid mines to explode, and it may detach

mines connected with electric cables and render them harmless. *

The latest and most effective device for protecting ships from mines is the *paravane*, invented by Commander Burney of the British navy during the first two years of the World War. The device consists of a pair of steel structures called *otters*, shaped very much like a torpedo, except that they are shorter. A series of serrated steel knives, for cutting the cables holding the mines in position are attached to the front end of each otter. The otters are attached to the ship by a tough steel towing-rope about 150

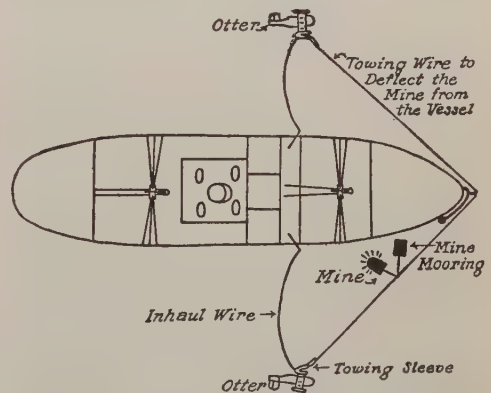


FIG. 2.—THE PARAVANE

feet in length. A large steel plane attached to the otter acts in such a way when the ship is in motion as to draw it away from the ship, so that the pair of otters with their towing lines form a huge triangle. When the moorings of a mine are caught by the towing line they are forced along to the otter, where they are cut by the serrated knives; then the mine rises to the surface, and it is easily destroyed. Over 4,000 British and a large number of American ships were equipped with paravanes during the war, and not a ship so equipped was destroyed by a mine.

SUBPOENA, *sub pe'na*, a written notice issued by a court, or an official having judicial powers, commanding a person or persons to appear at a certain time and place and give testimony in a case in court. Failure to comply with the summons constitutes contempt of court. See CONTEMPT. The Latin word *subpoena* means *under penalty*. A *subpoena duces tecum* (bring with you under penalty) is a command to appear as a wit-

ness with specified books, papers or other exhibits.

SUBSIDY, in public law, monetary aid granted by a government to an individual or commercial enterprise for the furtherance of a project believed to redound to the public good. Thus, when the Union Pacific Railroad was constructed, the United States government granted the railway corporation tracts of public land along its route as a partial reimbursement for the great sums of money expended in the railroad construction. Aid of this nature extended by a national, state or city government to a private enterprise to assist it in attaining a firm financial basis is known as a *subsidy*; the corporation receiving this financial assistance is said to be *subsidized*.

In international law, subsidy is money furnished by one nation to another to aid it in carrying on a war against a third nation, when such nation does not itself join directly in the conflict.

SUBTRACTION. See ARITHMETIC.

SUBWAY, or UNDERGROUND RAILWAY, a tunnel or system of tunnels constructed in a large city for the purpose of placing a railroad beneath the level of the street to relieve the congestion of travel or freight in the streets. A street is closed partly or wholly and an excavation made to the required depth and width. Floor, walls and roof are then laid and earth is filled in to the street level. After paving, the street is reopened to traffic.

Modern Subways. Many of the world's most progressive cities are adopting the subway system to replace noisy elevated structures which so detract from a city's beauty. London was the first city to construct a subway, and its original model was operated by steam. More modern subways are run by electricity. In Europe, London, Paris and Berlin have developed systems of underground railways to a high state of efficiency.

In the United States, New York, Boston and Philadelphia have overcome surface-car and freight obstructions by means of satisfactory subway systems. Chicago's subways are confined to freight alone, the lines extending for about seventy miles through the hub of the business district. However, in the not far distant future that city, too, will solve its surface-car congestion problems by the construction of a comprehensive system of rapid-transit tubes.

New York's subway is the most extensive of the world's systems. A large part of it is arranged with four tracks to accommodate express and local trains, which have from six to ten coaches each. The subway is owned by the municipality, and it is leased for operation to a private company. The cost of construction per mile of the New York system averaged \$2,000,000; at times to overcome obstructions it required an outlay totaling \$5,000,000 per mile, exclusive of equipment. It is estimated that on an average 3,000,000 passengers daily take advantage of this means of rapid-transit in that city. The subway is another of the many engineering feats of modern life which prove man's supremacy over the forces of nature in his endeavors to conquer them.

SUCCESSION, *suk sesh'un*, **WARS**, wars which have arisen from conflicting claims for the possession of a crown. In modern European history the most important of these struggles were the War of the Spanish Succession (1701-1714), the War of the Polish Succession (1733-1735), the War of the Austrian Succession (1740-1748) and the War of the Bavarian Succession (1778-1779).

The War of the Spanish Succession. Shortly before the death of Charles II of Spain, who had no direct heirs, several competitors laid claim to the throne, chief of whom were Louis XIV of France, son of the eldest sister of Philip IV, and Emperor Leopold of Austria, son of a younger sister of Philip IV. The other powers were greatly interested in this question, since the union of either France or Austria with Spain would have endangered the balance of power in Europe. After much negotiation Philip of Anjou was put forward by Louis XIV to represent the French claim, and Leopold nominated his second son Charles as his substitute, both declaring that Spain should never be incorporated with their respective dominions. The king of Spain eventually recognized Philip as his heir, and on the king's death, in November, 1700, Philip was proclaimed king at Madrid. He was recognized by most of the European powers except Austria, which in the following year declared war against France.

However, the arrogant and aggressive behavior of Louis, his recognition of the son of James II as king of England and his declaration that the accession of Philip to the

Spanish throne did not prevent his succession in France, caused England, Holland and Austria to combine against him and Philip in 1702. Prince Eugene of Austria had already opened the contest and had won some victories over the French. In 1702-1703, Marlborough, at the head of an allied army, reduced the French strongholds along the Meuse and in the Low Countries; in 1704 he joined his forces with Eugene, and together they defeated the Franco-Bavarian army at Blenheim. Barcelona was captured by an English force in 1705, and the earl of Peterborough gained some brilliant successes in this quarter. In 1706 the French were defeated by Marlborough at Ramillies, and by the Austrians at Turin. By 1707 the French and Spanish had driven the allies out of Spain, but in the following year Marlborough and Eugene reunited their forces and severely defeated the French at Oudenarde.

The resources of France were now crippled, and Louis made overtures of peace, which were rejected. The struggle was renewed with great vigor; Villars proceeded against Marlborough and Eugene, but he was defeated by the allies at Malplaquet in September, and matters continued to look very unfavorable for Louis. The war dragged on until the accession of the Archduke Charles to the Austrian throne changed the whole aspect of affairs, and the struggle, so far as Great Britain, France and Holland were concerned, was brought to an end by the Peace of Utrecht in 1713. Peace between Great Britain and Spain soon followed, the former gaining Gibraltar and Minorca; and in 1714 the emperor, Charles, forsaken by his allies, was reluctantly compelled to sign a treaty at Baden, recognizing Philip V as the king of Spain.

The War of the Polish Succession. When the Polish nobles elected as king of Poland Stanislas Leszczynski, father-in-law of Louis XV of France, they clashed with the interests of Russia and Saxony, who were determined that Augustus, elector of Saxony should be king. France was unable to keep Stanislas on the throne, and Augustus III was recognized king of Poland.

The War of the Austrian Succession. This arose on the extinction of the male line of the House of Hapsburg, by the death of Emperor Charles VI in 1740. By diplomatic negotiations before his death and by means

of the settlement called the Pragmatic Sanction, Charles had endeavored to secure the Austrian succession for his daughter, Maria Theresa. But there were several other claimants for the Austrian possessions, which included Bohemia, Hungary, northern Italy, part of the Netherlands and Austria proper. Besides Maria Theresa, the other claimants of importance were Charles Albert, elector of Bavaria, and Philip V of Spain; while the chief European powers which took an interest in the succession were France, Prussia and England. The first movement was made by Frederick II of Prussia, who, in December, 1740, marched his army into Silesia and secured that province as his share of the spoil. In the following year an agreement was entered into between France, Spain, Bavaria, Prussia, Saxony, Sardinia and Naples, by the terms of which a French-Bavarian army entered Upper Austria, another French army invaded the Austrian possessions in the Netherlands, and the forces of Spain and Naples occupied the Austrian territory in northern Italy. This having been done, the coalition arranged that Charles Albert should be crowned as emperor of Germany, under the title of Charles VI, and this was accomplished at Frankfort.

Meanwhile, Maria Theresa appealed for help to the Hungarian Diet, with such effect that a Hungarian force promptly invaded Bavaria and captured the city of Munich. She also formed an alliance with England, in accordance with which the English government furnished her with money, sent a fleet to Naples to demand the withdrawal of Neapolitan troops from Austrian territory, and supplied a portion of the army which defeated the French forces at Dettingen (1743). After this event negotiations for peace were begun, but with so little success that another league was formed, including England, Holland, Austria, Saxony and Sardinia, and a general European war broke out. Among the more important events of this general conflict were the Second Silesian War, begun by Frederick II; an attempted invasion of England by France, in favor of the Pretender, and the brilliant campaign in the Netherlands conducted by Marshal Saxe, terminating (May, 1745), in the victory of Fontenoy, where the English and allies were defeated. In 1745, however, Emperor Charles VII died, and his son, Maximilian Joseph, gave up all claim to the

Austrian throne and concluded peace with that country; in the same year the husband of Maria Theresa was elected emperor, under the name of Francis I. War was still continued against Austria by the French forces under Marshal Saxe, but ultimately a definite treaty of peace between all the powers was signed in 1748 at Aix-la-Chapelle.

The War of the Bavarian Succession. The Elector Maximilian Joseph of Bavaria died without legitimate issue in 1777, and Charles Theodore, the Elector Palatine, succeeded him. Charles also was without legitimate heirs, and in 1778 he made an agreement with Austria whereby Lower Bavaria was to be transferred to Austria and the natural children of Charles were to have the status of princes of the empire. The next heir, Charles, Duke of Zweibrücken, protested, and was supported by the king of Prussia. This brought on the war of the Bavarian Succession, which was settled by compromise before any serious fighting took place.

Related Articles. Consult the following titles for additional information:

Aix-la-Chapelle,	Frederick II
Treaties of	(the Great)
Blenheim	Louis XIV (France)
Charles VI	Maria Theresa
French and Indian	Marlborough,
Wars	Duke of
	Pragmatic Sanction

SUCK'ER, a name applied popularly to several fish because of the manner in which they use their mouths in eating. The best known is the *common sucker* of the streams and lakes of North America. There are several species, none of which is very large. All have roundish mouths on the lower side of the head, and thick, puckered lips, with which they suck up food from the mud of the bottom. In some places they are very abundant, but, because they have numerous small bones, they are not much eaten.

SUCRE, *soo'kra*, the official capital of the republic of Bolivia, known locally as *Chuquisaca*. Though it is the official seat of government, the sessions of Congress are held at La Paz, a city 300 miles northwest. However, at Sucre is the Supreme Tribunal of Justice.

The city is situated on a plateau, about 9,000 feet above the sea, on a small branch of the Pilcomayo River. The principal industries of the vicinity are mining and agriculture, the latter the more important. Places of interest are Saint Xavier University, the oldest university in South America, a fine

cathedral and the President's palace. The city was settled in 1536 by the Spaniards, who called it La Plata. It was the scene of the declaration of Bolivian independence in 1825, and later was named Sucre in honor of the republic's first President. Population, 1915, estimated, 29,686.

SUDAN, or **SOUDAN**, *soo dahn'*, an extensive region in the central part of Africa, south of the Sahara. Its boundaries are indefinite, but it extends from the Sahara Desert in the north to the Congo Free State on the south, and from the French Senegambia on the west to Egypt.

European Protectorates. The region is inhabited by negro and Arab tribes, but since 1902 it has been placed under the protection of European powers. The eastern part, or Anglo-Egyptian Sudan, is a protectorate of Great Britain. This section is divided into fifteen provinces, and their governors are either British officers of the Egyptian army employed under the Sudan government, or are British civil officials. Darfur, a district within the limits of the English Sudan, is still ruled by its hereditary sultan. Anglo-Egyptian Sudan covers an area of about 1,014,400 square miles; its population in 1917 was estimated at 3,400,000. Its chief towns are Khartum, Omdurman and Port Sudan.

The western section is under French influence, and comprises six colonies, notably Senegal, French Guinea and Dahomey. These colonies are each under a lieutenant-general of all the colonies. French West Africa covers an area of 1,478,000 square miles, with a population estimated in 1915 to be 12,438,567. English and French influences have been very effective in the development of the Sudan and the enlightenment of its people.

Topography. Sudan contains lofty mountains and broad plains, which are in some places nearly void of vegetation and in others interspersed with patches of forest and open country. Other localities are characterized by high plateaus. The loftiest mountain range is the Adamawa, whose highest summit is 10,000 feet above the sea. Much of the Sudan is covered with a luxuriant growth of vegetation. The climate is hot, and in the lowlands along the coast and streams it is extremely unhealthful for Europeans.

Production and Commerce. The Sudan is the chief source of the world's supply of gum arabic and ivory. Cotton, sugar, rice, ba-

nanas, dates and other tropical fruits are raised and exported. From the dense jungles of Lake Chad, inhabited by wild elephants, come most of the world's supply of ivory.

In the eastern section, where there is less vegetation, cattle, camels, sheep and ostriches are raised; the ostrich feathers from this region are famed. Gold is the only mineral which at present is being mined with any degree of success, although iron and silver are present in abundance.

SUDAN GRASS, a hay grass introduced by the Federal Department of Agriculture into the United States in 1909 from Khartum, Sudan. The excellent results of the initial test in Texas were so encouraging that thousands of acres were subsequently planted in the South and Southwest, in humid as well as in irrigated areas.

Sudan grass has no perennial rootstock, which eliminates the danger of its becoming a pest. It is cultivated annually from seed as a forage plant as well as for its seed, is one of the best drought-resisting plants known to the American farmer, and thrives in almost any soil. The first crop matures in from sixty to eighty days; and from two or three cuttings of hay are obtainable each year, depending on the region where it is planted. In Hawaii it is considered one of the most successful grass introductions ever made.

SUDERMANN, HERMANN (1857-), a German novelist and dramatist, born at Matz-sicken, East Prussia. After studying at the universities of Königsberg and Berlin, he became a tutor, later a journalist, and in 1887 published his first collection of stories. In the following year he wrote the novels *Dame Care* and *Regina* and the drama *Honor*, the last of which brought him fame. *Magda*, his greatest drama; *The Joy of Living*, a powerful play dealing with the struggle between natural selection and marital obligation; and *Es War*, a psychological novel, are representative. They are among the most significant productions in present-day German literature, and are remarkable alike for the ideas they embody, for style and for the virile picture of humanity they present. Important works not already mentioned are *John the Baptist*, *The Song of Songs*, *The Undying Past* and two collections of one-act plays entitled respectively *Roses* and *Morituri*.

SUE, su, MARIE JOSEPH EUGENE (1804-1857), a French novelist. He inherited a large fortune from his father, a surgeon in Napo-

leon's army, and after studying medicine and practicing for a time, he settled at Paris and devoted himself to literature. His first work was a sea novel, *Kernock, the Pirate*. This was quickly followed by *Plick and Plock*, *Atar-Gull*, *The Salamander* and the *Lookout of Koatven*. Sue wrote some historical fiction, but his most famous works are *The Mysteries of Paris* and *The Wandering Jew*, books dealing with the mysterious and supernatural. His later novels are *The Foundling*, *The Seven Capital Sins* and *The Mysteries of the People*. In 1850 Sue was elected to the Constituent Assembly as an advanced radical.

SUEZ, soo ez', a seaport situated at the head of the Gulf of Suez, seventy-six miles east of Cairo, with which it is connected by rail; it is also at the northern end of the Suez Canal. Despite the improvements which the opening of the canal brought in its train, as well as its increased population and apparent commercial importance, Suez has remained dirty and unattractive. It has never regained its former position as a prosperous trade center for the Orient, as it is but little affected by the vast commerce of the canal. Most of the houses are built of sun-dried brick. The city contains a number of mosques and, in the European quarter, several substantial hotels, warehouses and modern structures. Population, 1917, 31,000.

SUEZ CANAL, a ship canal across the Isthmus of Suez, connecting the Mediter-



THE SUEZ CANAL

anean with the Red Sea. It extends from Port Said, on the Mediterranean, to Suez, on the Gulf of Suez, a distance of one hun-

dred miles, and is the longest ship canal in the world. About sixty miles of the channel is through shallow lakes. It is a sea-level canal and has no locks. Work on it was begun in 1859, and the structure was completed in ten years. The original expense was about \$95,000,000.

The Suez Canal was undertaken and carried to completion under the direction of Count Ferdinand de Lesseps, a French engineer. Its construction shortened the sailing distance between England and India more than 5,000 miles, and it has materially increased the traffic between European and Asiatic countries. The canal is lighted by electric lights, so that ships can navigate it by night as well as by day. About 4,000 vessels pass through it each year, and the annual tolls amount to about \$25,000,000. It is under the management of an international commission and in times of peace is open to ships of all nations on equal terms. During the World War Germany made several attempts to destroy the canal and thus cripple Great Britain, but the efforts failed. See CANAL.

SUFFRAGE, *suff'raje*, in a representative government, is the act or right of a qualified voter to participate in the election of officers or in the making or approval of laws by the initiative and referendum. The general idea of suffrage is traced to the origin of the jury system. The principal qualifications now required for suffrage are intellectual ability, property possession, moral character and residence. Not all states lay such restrictions, and no state requires all of them.

Suffrage in the United States. At various times in all sections of the United States all the above restrictions were in force, with the addition of religious affiliation. In colonial days less than one-fourth of the men were given the voting power, because of religion and property qualifications and religious distinctions. These bars were gradually lifted. The Federal Constitution has always recognized the right of each individual state to decide upon whom the right to vote shall be conferred, but specifically specifies that "race, color, or previous condition of servitude" shall not disqualify any citizen of his right of franchise.

The attainment of the age of twenty-one years is a qualification for voting in every state. Except in a few states where, for local reasons, special educational and proper-

ty tests are exacted, universal manhood suffrage exists in every state in the Union. An amendment to the Constitution granting suffrage to women passed both houses of Congress in 1919 and awaited ratification by the requisite number of state legislatures.

Related Articles. Consult the following titles for additional information:

Australian Ballot
Ballot
Election

Short Ballot
Woman Suffrage



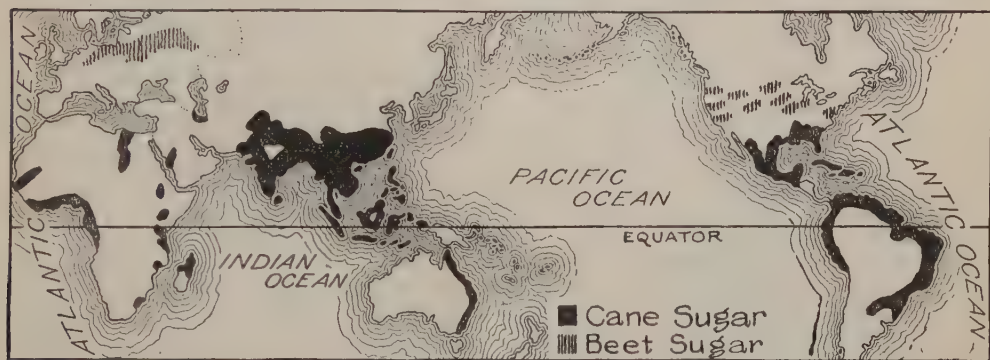
SUGAR, one of the most essential articles of food, is found in the juices of many plants, but in only a few in sufficient quantities to make its extraction commercially profitable. These are sugar cane, sorghum, the sugar beet and the sugar maple. Small quantities are sometimes obtained from the cocoanut and other palms. The sugar of commerce is practically all obtained from sugar cane and beets.

Cane Sugar. This is prepared from the sugar cane. The leading countries in the production of this plant are Cuba, Java, Porto Rico, Brazil, Argentina and certain sections of the United States, particularly Louisiana and Hawaii. The cane found in the tropical regions is the richest in sugar. That of the West Indies furnishes about 225 pounds of sugar to a ton of cane, while that from Louisiana yields only about 160 pounds. In the manufacture of sugar the cane is first crushed between heavy rollers, which press out the juice. The rollers are in two or three sets, called *mills*, each mill so adjusted that it presses the cane harder than the one before it. As the crushed stalks pass from one mill to another, they are moistened with water of varying temperature, in order that the remaining juices may be liberated; the crushed stalks, or *bagasse*, are used for fuel under the boilers. By this process about nine-tenths of all the cane sugar is manufactured. The juice is immediately treated with sulphurous acid gas, and it is then mixed with lime; the gas bleaches it and permits excessive liming, which materially aids in the clarification of the juice and prevents the

separation into grape sugar and cane sugar. The juice is then filtered, after which it is ready for reduction by evaporation.

For the first sugars, the juice, after being reduced to a syrup in evaporators, is boiled at a low temperature in vacuum pans until the water is all driven off and crystallization takes place, forming a *masscuite*, which is pure sugar mixed with a small per cent of syrup. This *masscuite* is dropped into a mixer, where it is stirred and kept from caking by revolving paddles. From the mixer it is fed to revolving cylinders called *centrifugals*, on the sides

sections in the tropical and semi-tropical regions. Beets, on the other hand, thrive in temperate regions and over a much wider area. The manufacture of beet sugar was one of the important industries in France and Germany before the World War, and it was suspended only during the period of that conflict. Sugar beets are successfully grown in a number of the states of the United States and the quantity of beet sugar manufactured in that country is increasing from year to year. Michigan, Colorado, Nebraska, California and Arizona are among the leading states engaged in the industry. In the manufacture



SUGAR PRODUCING REGIONS

of which is a basket of wire netting. As the cylinder revolves at a high rate of speed the *masscuite* is washed, the amount of washing varying with the quality of the sugar manufactured. The liquid portion is forced out through the meshes of the basket, and this, after several reboilings, constitutes the molasses of commerce. The solid crystals of sugar are left within the centrifugal. The sugar is then dropped on to conveyors and taken to the granulator to be thoroughly dried, the granulator being a revolving cylinder heated by steam, through which the sugar is fed by gravity. Sugar thus made is placed on the market as *granulated sugar*. *Loaf sugar* is made by packing the fresh sugar in molds, where it is allowed to form blocks, which are sawed to the desired shape. Cheaper grades of sugar, known as seconds and thirds, are made from the syrups taken from the first sugars. The first is placed on the market as *coffee sugar*, and the latter is known as *brown sugar*; both are sold principally to the large refineries.

Beet Sugar. Climate and soil limit the area in which sugar cane can grow to certain

of beet sugar the diffusion process is used. The beets are first sliced by machinery, then placed in iron cells, where a constant circulation of water is kept up, the juice being drawn from the cell holding the fresh chips, and the fresh water being introduced into the last of a series of cells, just before dropping the chips. The liquid thus obtained is first treated with carbonic acid gas; it is then mixed with lime, after which carbonic acid gas is forced through it a second time. The gas combines with the lime and other impurities and causes them to settle at the bottom of the tank. The liquid is then passed through bag filters, when it is ready for evaporation. The remaining processes are the same as those used in making cane sugar. A ton of beets will make from 320 to 400 pounds of sugar. The waste chips are fed to cattle.

Maple Sugar. Maple sugar is obtained from the sap of the sugar, or rock, maple and it is highly prized on account of its delicate flavor. The sugar season begins in the spring, as soon as the sap commences to circulate in the trees. The sap is obtained by boring a small hole in the trunk of the tree, from an

Outline and Questions on Sugar

I. SOURCES

- (1) Sugar Cane
 - (a) Where grown
 - (1) United States
 - (2) Other countries
 - (b) Description
 - (1) Height
 - (2) Leaves
 - (3) Resembles what plant?
 - (c) Sugar mills
 - (1) Processes
 - (2) Crushing stalks
 - (3) Reduction of sap
 - (4) Refining, etc.
 - (d) Products
 - (1) Granulated sugar
 - (2) Loaf sugar
 - (3) Brown or raw sugar
- (2) Beets
 - (a) Where grown
 - (1) United States
 - (2) Other countries
 - (b) Sugar factories
 - (1) Processes
 - (2) Slicing beets
 - (3) Drawing juice
 - (4) Refining, etc.
- (3) Maple Sap
 - (a) Where produced?
 - (b) Season
 - (c) Securing sap
 - (d) Sugar-making (see sugar cane)
 - (e) Flavor, value, etc.
- (4) Sorghum
 - (a) Resembles what plant?
 - (b) Process (see sugar cane)
 - (c) Product
 - (1) Syrup
 - (2) Sugar—not of commercial importance

II. SUGAR REFINERIES

- (1) Location of
- (2) Work of refining
- (3) Annual output of cane sugar, beet sugar
- (4) United States
 - (a) Annual output of cane sugar
 - (b) Annual output of beet sugar
 - (c) Annual consumption of sugar

- (d) Annual importation of sugar
- (e) Annual consumption of individual.

III. BY-PRODUCTS

- (1) Molasses and Syrups
 - (a) Sorghum
 - (b) New Orleans molasses
 - (c) Foundation for all syrups
- (2) Bagasse
- (3) Beet chips

Questions on Sugar

How many pounds of sugar are made from a ton of beets? From a ton of West India cane? Louisiana cane?

What is the sugar you use daily made from—beets, sugar cane or maple sap?

How is loaf sugar made?

In what cities are some of the sugar refineries located in the United States?

What are the chief uses of maple sugar?

What is sorghum? Why is not the cane suitable for sugar?

What do we mean by raw sugar? Brown sugar?

What countries lead in the raising of sugar cane?

How does the cane in the tropics compare with that of cooler climates?

What becomes of the crushed stalks?

Upon what does the growth of the sugar cane depend largely?

For how long a period does one planting last? Is this an important factor?

What is done with the beets after extraction of the sugar? With the cane stalks?

What color is the raw sugar? What is used to whiten it?

Is a maple tree injured by tapping for its sap?

Why can cane sugar not be grown in cool climates?

Is there extensive production of sugar beets in any country except the United States?

Is any sugar cane grown on the continent of Europe?

Will cane for sorghum grow farther north than sugar cane?



SUGAR

1, Sugar Beets.
2, Blossom, Sugar Cane, enlarged.

3, Leaf of Sugar Cane.
4, Leaf and Fruit, Sugar Maple.
5, Blossom, Sugar Maple.

6, Maple-Sugar Orchard.
7, Sugar Cane.

inch to an inch and a half deep, placing in this an iron spile, containing a hook, to which a bucket is attached. The sap drips through the spile into the bucket. The sap is collected and evaporated in the sugar houses, constructed specially for the purpose. The evaporating apparatus is constructed on such a plan that the sap flows in at one end and the syrup flows out at the other. Four gallons

ing a thick layer of animal charcoal. The filter removes the coloring matter. The syrup is collected underneath the tanks and boiled in vacuum pans, until the water has been driven off and crystallization takes place. The mass-cuite is then treated the same as that from cane and beet sugar in the preparation of granulated sugar. The largest sugar refineries in the United States are located in New York, New Orleans, Philadelphia and San Francisco.

SUGAR CANE, a plant of the grass family from which about one-half of the sugar of commerce is obtained. Sugar cane is supposed to be a native of the tropical regions in Asia, but it is not at present found in the wild state. In general appearance sugar cane resembles maize or Indian corn. It grows to heights varying from five to eighteen feet, according to soil, climate and cultivation. The stalks vary from one to two inches in diameter, and are jointed like corn stalks. At each joint there is a bud or eye, which, when the cane is planted, sprouts and produces a new plant. The leaves grow to about three feet in length and are about two inches wide at the base, tapering gracefully to a point; they resemble leaves of corn.

When young the plant presents a fresh, green appearance, but as it matures some of the leaves turn a purplish hue, and those at the bottom turn yellow, wither and fall off. The illustration in the color plate is of a mature plant, such as grows in the tropics. Further north the sugar cane is a forced plant and does not blossom.

Sugar cane is grown extensively in the tropical regions of Asia, Cuba and other West Indian Islands, Hawaii and Louisiana and to a less extent in several countries of Europe and the other Gulf states. The soil should be very fertile and carefully prepared. In this country the soil is plowed and thrown up into ridges from five to seven feet apart. A deep furrow is plowed in the top of the ridge, and the cane is laid on this for covering. The best results are obtained by planting only the upper joints of the cane. Two or three cuttings may be laid side by side in the furrow. The cane is covered with a plow and sometimes the ground is rolled. In Louisiana it requires about eight months for the crop to mature. During growth the land is frequently cultivated to keep it free from weeds and to prevent evaporation.

Cane Sugar

Cuba		2875
British India		2704
Java		1578
Hawaii		579
Porto Rico		381

Beet Sugar

Germany		2911
Russia		1521
Austria		1340
France		879

Maple Sugar

Quebec		7
Vermont		4
Ontario		2½
New York		2

Figures represent thousands of short tons.

SUGAR PRODUCTION

The source of the greater proportion of three kinds of sugar.

of sap make a pound of sugar. Maple sugar is placed on the market in the form of syrup and sugar. It is now used only as a delicacy and commands a very high price. The leading states in its production are Vermont, New York and Ohio. The province of Quebec now holds the first place in the production of this delicacy.

Sorghum. This is a variety of cane used in the manufacture of syrup. It will grow in much cooler climates than sugar cane, but the amount of sugar obtained from it is not sufficient to be worthy of consideration, when compared with the sugar made from cane and beets. The sap is suitable for the manufacture of syrup only, and the process used is similar to that employed in the manufacture of cane sugar.

Refining. Much of the sugar imported into the United States is received in the crude form, known as *raw sugar*. This is dissolved in water to which a small quantity of lime has been added. This solution is then heated by steam and passed through filters which consist of deep vats with perforated bottoms contain-

At harvest time the cane is cut about two inches from the ground and stripped of leaves. The top is then cut off and the stalks are piled in rows for hauling to the factory. In Cuba and other tropical countries where there is no danger from frost, the crop is allowed from ten to eighteen months in which to mature. Small crops are obtained from one planting, but the first crop is the most valuable and for good results the field should be replanted every third year. See SUGAR.

SUICIDE, *su'i cide*, the act of intentionally taking one's own life. Statistics on suicide are by no means complete; for, owing to the ignominy which society attaches to the deed and, in places, to the law's manner of dealing with it, many cases of suicide are not reported as such. The records available present such an unaccountable array of facts as to make them merely interesting. It is shown that four males commit suicide to one female; most of them between the ages of fifty-five and sixty-five; that single people have a stronger tendency than married persons to self-destruction. It seems that suicides are much more frequent among civilized than among barbarous peoples; and that among the former the highest percentage of suicides are in the ranks of those who work with their heads rather than with their hands. The professions, the arts, business administration and the army claim a large percentage.

These facts go to show that suicide is not an indication of mental weakness, and the conclusion is further supported by the lives of some of the world's greatest men who committed suicide or contemplated it. That country which shows the highest percentage of suicides is Saxony; the lowest, Ireland. Undoubtedly if there were records for comparison it would be found that suicides among Asiatics are more frequent than among Western peoples, Christianity being a deterrent influence, while some Eastern religions have favored self-destruction. Until very recent times the laws of China and Japan permitted a certain class of criminals to perform their own execution by "hara kiri" (which see).

The manner of ending one's life seems to depend largely on environment. In cities death by gas or jumping from high buildings is not unusual; in warm countries drowning is most frequently resorted to. Poisoning and shooting are frequent means to the end sought.

The facts as stated point to no external cause of suicide, but indicate, rather, individual reaction to circumstance. Despondency is a chief cause of suicide in America. Jealousy drives many to suicide; brooding over religion is also a cause. In general, it may be stated that lack of intellectual diversion is one of the most frequent causes of suicide. The person who has healthy interests and who cultivates an altruistic attitude towards his fellows, is not likely to die by his own hand.

SULEIMAN II, *soo'lah mahn*. See SOLYMAN II.

SULLA, LUCIUS CORNELIUS (138-78 B. C.), a Roman statesman and general. He served with distinction under Marius in the Jugurthine and Cimbrian wars and was chosen praetor. For his services in the Social War, he was appointed consul in 88 B. C., and the Province of Asia with the conduct of the war against Mithridates, fell to his lot. Marius also wanted this command, and to carry his point he resorted to acts of violence, by which Sulla was compelled to escape from Rome. But Sulla reëntered the city at the head of his army, drove Marius to Africa and then sailed for the East at the beginning of 87 B. C. He expelled the armies of Mithridates from Europe, crossed into Asia and was everywhere victorious, gaining wealth for himself and his soldiers and forcing Mithridates to conclude a peace. Sulla now hastened to Italy, where, although Marius was dead, the Marian party was still strong, and after a number of combats, he entered Rome in triumph in 82. He put to death thousands of his enemies throughout Italy, had himself declared dictator and then ruled without restraint, repealed and made laws, abolished the tribuneship and settled his veterans in various parts of Italy. In 79 he laid down his dictatorship and spent the rest of his life in retirement. See MARIUS, CAIUS.

SULLIVAN, ARTHUR SEYMOUR, Sir (1842-1900), an English musician, born in London. He completed his musical education at the Royal Academy of Music. In 1858 he went to Leipzig, and on his return, in 1862, he at once attracted attention by his music to Shakespeare's *Tempest*. He wrote several oratorios and many songs and anthems, one of the most famous being *The Lost Chord*. Perhaps his most popular compositions were the burlesque operettas which he produced in collaboration with W. S. Gilbert. Among the

most popular are *Pinafore*, *Pirates of Penzance* and the *Mikado*. One of his finest compositions was written for an arrangement of Longfellow's *Golden Legend*. He was knighted in 1883.

SULPHATES, *sulfate's*, salts of sulphuric acid. Of the sulphates, some are very soluble, some sparingly soluble and some insoluble. The most important sulphates are sulphate of aluminum and potassium, or alum; sulphate of ammonium, employed for making carbonate of ammonia; sulphate of copper, or blue vitriol, much used in surgery and in dyeing, and for preparing certain green coloring matters; sulphate of iron, or green vitriol, used in making ink and very extensively used in dyeing, in calico printing and in medicine; sulphate of manganese, used in calico printing; sulphate of quinine, much used in medicine; sulphate of zinc, or white vitriol, used in surgery, in the preparation of drying oils for varnishes and in calico printing.

Related Articles. Consult the following titles for additional information:

Alum	Epsom Salt
Barium	Glauber's Salt
Blue Vitriol	Gypsum
Calcium	Strontium
Calomel	Sulphuric Acid

SULPHUR, one of the non-metallic elements, easily recognized by its light yellow color and peculiar odor, often experienced in the burning of a match. Because of the low temperature at which it burns it was formerly called *brimstone*, which means *burn stone*. Sulphur has been known from the earliest ages. It occurs in a pure state, in beds of gypsum or clay, usually in volcanic regions. It also forms many compounds, some of which are valuable ores as pyrite, sulphide of iron, galena, sulphide of lead and cinnabar, or sulphide of mercury. Pure sulphur is commonly met with in two forms—as a compact, brittle solid, and as a fine powder. It is nearly tasteless, and when rubbed or melted it emits a peculiar odor. It is insoluble in water and is not very readily soluble in alcohol, but it is taken up by spirits of turpentine, by many oils and by carbon disulphide. It is a non-conductor of electricity and is readily melted and volatilized; it melts at 232° F., and between 232° and 280° it possesses the greatest degree of fluidity. It possesses the peculiar property of solidifying at a higher degree, or when raised to 320°. From 480° to its boiling point (792°) it again becomes fluid, and at 792° it rises in vapor, which condenses

in close vessels in the form of a fine, yellow powder, called *flowers of sulphur*. The roll sulphur of commerce is made by pouring melted sulphur into cylindrical molds, where it is cast.

Where Sulphur is Found. Formerly nearly all the sulphur of commerce came from Sicily, where there are large deposits in a pure state; but a few years ago a valuable deposit of pure sulphur was discovered in Calcasieu Parish, Louisiana, and now Louisiana leads in the production. The deposit covers an area of seventy acres, is 110 feet thick and lies from 100 to 150 feet below the surface. This bed lies in the midst of an extensive alluvial region and bears testimony to the tremendous volcanic activity of some remote geological era. In extraction the sulphur is melted with compressed steam; then the melted portion is pumped to the surface, where it is allowed to cool in large masses, which are broken up and loaded on to cars. Sulphur is also found in various places in Italy, in the Caucasus, in upper Egypt, Japan, New Zealand and several other places.

Compounds of Sulphur. Besides the ores mentioned above sulphur forms a large number of compounds, some of which are extensively used in the arts. When burned in the air it unites with oxygen, forming *sulphur dioxide*, a colorless gas with a suffocating odor always associated with burning sulphur. When moist this gas bleaches vegetable colors, and it is used in bleaching such fabrics as chlorine and other bleaching agents injure.

Hydrogen sulphide, or as it is more commonly called, sulphureted hydrogen, is the gas usually found in the water of sulphur springs, and is readily recognized by its disagreeable odor.

Carbon disulphide is a volatile liquid, with a poisonous vapor, produced by the action of sulphur upon carbon at high temperatures. It is used for dissolving rubber and gutta-percha, for extracting essential oils from plants and seeds and for extracting bitumen from minerals.

Ferrous sulphate, commonly known as *copperas*, or *green vitriol*, is extensively used in dyeing and in the manufacture of pigments and ink. *Copper sulphate*, or *blue vitriol*, is the most useful compound of sulphur and copper. It is used extensively in electric batteries, in electroplating, in calico

printing and dyeing, and for preserving timber. But the most useful of all compounds of sulphur is *sulphuric acid* (which see).

Uses of Sulphur. The most extensive use of pure sulphur is in the manufacture of sulphuric acid. Next in importance is its use in the manufacture of gunpowder and other explosives, and in fireworks. It is also extensively used in vulcanizing rubber. In medicine it is used internally as a laxative and as a remedy in rheumatism. It is used externally as an ointment in certain skin diseases. Sulphur is an important ingredient of the human system; it is estimated that the body of a healthy adult contains about one-fourth pound of it in combination.

SULPHURETED HYDROGEN, *sul'fu ret ed hi' dro jen*, or **HYDROGEN SULPHIDE**, *sul'fide*, a colorless, inflammable gas, a compound of sulphur and hydrogen. It occurs in some mineral waters and as a volcanic gas, and forms wherever albuminous substances containing sulphur are allowed to decompose. In the laboratory it is produced by causing sulphuric or hydrochloric acid to act on iron sulphide. It gives to water a sweetish taste and to air the odor of rotten eggs. The gas is very poisonous, and even a little of it in the air is dangerous when breathed. When mixed with one and one-half volumes of oxygen and ignited it explodes. A strip of filter paper soaked in a solution of lead acetate on exposure to the gas turns brown or black. This is a good test to discover the presence of the gas. Sulphureted hydrogen is extensively used in analytical chemistry.

SULPHURIC, *sul fu'rik*, **ACID**, the acid most extensively used in the arts, is a compound of sulphur trioxide and water. Pure sulphuric acid is a dense, oily, colorless fluid, exceedingly acid and corrosive, decomposing all animal and vegetable substances by the aid of heat. It unites with alkaline substances and separates most of the other acids from their combinations with the alkalies. It has a very great affinity for water and unites with it in every proportion, producing great heat; it attracts moisture strongly from the atmosphere, becoming rapidly weaker if exposed. The sulphuric acid of commerce is never pure, but it may be purified by distillation. With bases, sulphuric acid forms salts called sulphates, some of which are neutral and others acid. A very strong form of sulphuric acid, known as *Nordhausen acid*,

is prepared by heating green vitriol in closed vessels. It is chiefly used in the arts for dissolving indigo.

Uses. Sulphuric acid is used extensively in the arts and is, in fact, the chief agent for obtaining most of the other acids, by extraction from salt. In the chemical laboratory, the uses to which it is put are innumerable, and in the separation of copper, cobalt, nickel, silver and platinum from their ores, it is an important agent. Phosphorus, bromine, iodine, ether, starch, glucose, sugar, phosphorescent drinks, parchment paper, celluloid, nitroglycerine, gun-cotton, coal tar colors and many dyes are all prepared by its aid. It is used in calico printing and in tanning, in dyeing, in refining tallow and many of the oils and in the preparation of all the sulphates. When to all these important uses we add its function as a medicinal agent, it is evident that sulphuric acid is really the most important of all the acids.

Manufacture. Sulphuric acid is manufactured on a large scale by burning sulphur or iron pyrites in a furnace and conducting the fumes with oxide of nitrogen into chambers lined with lead and containing steam. The sulphur dioxide formed by the burning sulphur takes an atom of oxygen from the nitric oxide and becomes sulphur trioxide. This unites with the steam and forms sulphuric acid, which gathers on the floor of the chamber.

Formerly sulphuric acid was made by distilling green vitriol, or sulphate of iron. From this process of manufacture it is sometimes called *oil of vitriol*.

SUL'TAN, an Arabic word meaning *mighty one*, or *lord*, is the ordinary title of Mohammedan rulers. The ruler of Turkey assumes the title of *sultan-es-selatin*, or sultan khan, "sultan of sultans." The title sultan is also applied to the sultan's daughters, and his mother, if living, is styled *Sultan Valide*.

SULU, *soo'loo*, **ISLANDS**, the southernmost group of the Philippines, comprising nearly 200 small islands, the total area of which is about 1,600 square miles. Politically they are a part of the Philippine province of Moro. The archipelago is divided into six groups. Named in their order from the northeast, these are Basilan, Samales, Sulu, or Jolo, Siarsi, Kinatussan and Tawi-Tawi. Sulu is the most important. Nearly all the islands are covered with forests, which contain considerable teak and sandalwood. The

chief cultivated crops are rice, cacao, maize and various sorts of roots. Cocoa, bananas, breadfruits, mangoes and oranges are native to the island. The natives are chiefly Moros.

SUMAC, *su'mak*, or **SUMACH**, a genus of shrubs and small trees, containing about one hundred species, widely distributed throughout the world, in temperate and tropical climates. The most general North American species is the *Virginian*, or *stag-horn*, *sumac*, distinguished by crooked, downy branches and small red berries. It turns flaming red in the autumn. The *smooth-leaved sumach*, which is also common in the United States, has acid leaves and ornamental red berries. Both these varieties produce valuable dye. Two closely - allied species, found in almost all parts of the United States, are poisonous. They are creeping



SMOOTH-LEAVED SUMACH

or climbing vines, bearing groups of three leaflets. Another poison variety, which grows in swamps, is a shrub from fifteen to twenty feet high, which bears clusters of greenish-white flowers. Its leaves are extremely poisonous to some persons, producing serious inflammation or eruption of the skin. A Japanese poisonous variety produces a sap from which a fine lacquer is made.

SUMATRA, *soo mah'tra*, a great island in the Indian Ocean, separated from the Malay Peninsula by the Strait of Malacca and from Java by the Strait of Sunda. The equator traverses it about midway. Its greatest length is about 1,050 miles, its breadth about 240 miles, and its entire area about 180,000 square miles. Banca and other islands are adjacent to the coast. The west side of the island is mountainous, with peaks ranging in height from 2,000 feet in the south to 5,000 feet farther north, and culminating in Indrapura, a volcano 12,400 feet in height. Gold, copper, tin and iron are

found in abundance, and deposits of coal occur in places. The chief rivers are the Rokan, the Musi, the Jambi and the Indragiri, all of which have extensive deltas. The climate is unhealthful; rain falls almost incessantly in the south.

Mangroves are the chief vegetable product of the coast; in the more elevated regions, are found myrtles, palms, figs and oaks. The camphor tree is indigenous to the north, while among the curiosities are the upas tree and the gigantic rafflesia. Pepper, rice, sugar, tobacco, indigo, cotton and coffee are cultivated for export; also, in smaller quantities, are benzoin, catechu, gutta-percha, caoutchouc, teak, ebony and sandalwood. The animals include the elephant, tapir, two-horned rhinoceros, tiger, orang-utan, some species of deer and antelope and numerous birds and reptiles. The domestic animals are cows, pigs and horses.

The island is for the most part under the authority of the Dutch. There is a mixed population of Malays, Chinese, Arabs and native tribes, some of whom resemble the Caucasian types. The chief religion is Mohammedanism. See map, ASIA.

SUMMER, the season of the year between spring and autumn, beginning with the summer solstice, about June 21, and ending with the autumnal equinox, about September 22. In Canada and the United States June, July and August, the hottest months of the north temperate zone, are generally regarded as the summer season.

SUMMONS. See WRIT.

SUMNER, CHARLES (1811-1874), an American statesman, born at Boston, Mass., and educated at Harvard University. In 1834 he was admitted to the bar, and in 1836 he published three volumes of Judge Story's decisions, subsequently known as *Sumner's Reports*, and he also edited a periodical called the *American Jurist*. The years between 1837



CHARLES SUMNER

and 1840 were spent in Europe, and the period following was occupied with legal practice in Boston. Sumner first gained note as

an orator in 1845 by a famous address, *The True Grandeur of Nations*. Five years later, as a supporter of the anti-slavery cause, he was elected to the Senate of the United States by a coalition of Free-Soilers and Democrats. He remained there until his death, an active and distinguished champion of freedom.

In May, 1856, his speech *The Crime Against Kansas*, which vigorously attacked slaveholders, brought a violent assault by Preston S. Brooks, a member representing a slaveholding state (South Carolina). The injuries inflicted compelled Sumner to absent himself from public duties for nearly four years and eventually caused his death.

Sumner supported Lincoln and Hamlin and advocated the view of reconstruction known as the theory of "state suicide" (see RECONSTRUCTION); he opposed President Johnson and the home and foreign policy of President Grant, and he supported Greeley in 1872.

SUMPTUARY LAWS, the general term applied to laws to repress extravagance. Such laws were common in ancient times, being directed especially, in both Greece and Rome, against extravagance in dress and in entertainments, the theory being that by regulating expenditures poverty and crime could be checked. Sumptuary laws were revived by Charlemagne, and in France various laws and decrees of a similar nature were passed, down to the reign of Louis XV. In England such laws were passed from the reign of Edward III to the time of the Reformation.

In the United States, the Federal and state constitutions forbid, generally, the passage of sumptuary laws. However, some of the laws passed for the protection of health and safety are sumptuary in character.

SUMTER, S. C., the county seat of Sumter County, forty-three miles southeast of Columbia, on the Atlantic Coast Line, the Carolina, Atlantic & Western and the Southern railroads. The city is in an agricultural region, and is known for its extensive trade in cotton. It contains more than fifty industrial establishments, including cotton mills, a cotton compress, cottonseed oil factories, planing mills and manufactures of telephones, golf sticks, coffins and caskets. The city has a Y. M. C. A. and several academies. The commission form of government was adopted in 1913. Population, 1910, 8,109; in 1920, 9,508.



SUN, the source of heat light and life, the controlling body in the solar system and the most conspicuous object in the sky, is only one of the thousands of stars—

Which stand as thick as dewdrops on the fields Of heaven.

Notwithstanding its importance to us it should be remembered that not only is the sun a star, but that it is by no means one of the largest. Arcturus, for instance, is possibly

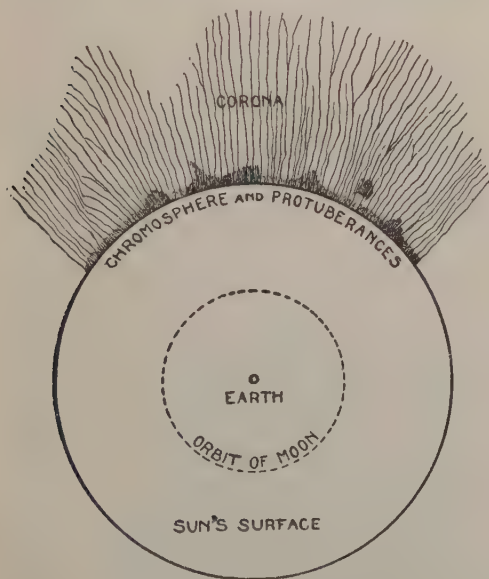
100 times the diameter of the sun and gives out 6,000 times more light. The North Star is probably 200 times as strong as the sun.

Size of the Sun. The sun is more than 865,000 miles in diameter, or 110 times the diameter of the earth, and in volume it is 1,300,000 times the size of the earth. Its density, however, is about $\frac{1}{4}$ that of the earth, and, accordingly, its weight is only 334,000 times as much. Its gravity is 27 times that of the earth, so that if it were possible for a man to get to the surface of the sun, he would weigh more than two tons and would probably be crushed by his own weight. The sun's distance from the earth is about 93,000,000 miles. It turns on its axis once in about 26 days, the equatorial regions rotating more rapidly than the regions farther away from the equator. This curious fact is thought to prove that the sun is a gaseous mass, but it is not thoroughly understood by astronomers.

Structure of the Sun. The vast unknown interior of the sun is, of course, wholly invisible to us, but astronomers can note the shining surface, which they call the *photosphere*; a cloak, or envelope, of burning hydrogen, called the *chromosphere*, which shows red through the spectroscope; irregular *prominences*, connected by the chromosphere and extending up through it, vast planes of hydrogen, thousands of miles high, beside which our earth is but a speck, and a still more vast luminous envelope, called the *corona*, seen in total eclipses, where it shows in hairy, radiating lines, long near the equator and shorter about the poles. The surface of the sun does not appear clear and equally brilliant in all parts, but is mottled with

small patches of greater light distributed in streaks and groups. The spots, which seem to consist of a dark center, surrounded by radiating lines, are irregular in shape and vary greatly in size, from 1,000 to 100,000 miles in diameter. They are not constant in shape, but often split into two parts. Though there are always some spots visible, yet there are periods, recurring at regular intervals, in which the spots are much more numerous. Sometimes a spot is visible for but a few hours, while again it may last for months. The spots probably are depressions in the surface, in which the cooler gases have collected. Two kinds of prominences are seen—the eruptive, like shooting flames, and the cloudlike, which seem to float above the surface. The composition of these prominences and of the corona was discovered by the use of the spectroscope during an eclipse; they are thought to be principally burning hydrogen, yet other gases are probably mingled with it.

From the diagram, the comparative size of the earth and the moon's orbit and the relative shapes and sizes of the visible parts of the sun may be seen. It should be understood that this diagram is a section only, and the



corona, chromosphere and protuberances extend in every direction from the center of the sphere. The discoveries made by the use of the spectroscope have been marvelous and have enabled astronomers to learn what materials enter into the composition of the sun.

It has been shown that these substances are the same as those which enter into the composition of the solid part of the earth. The sun is, then, probably composed of heated gases held together by gravity. It is not thought that the sun burns as we see a piece of wood burn, for there has been time since the earth was first inhabited for the sun to burn and cool off, if that were the case; but there has been no appreciable falling off in temperature. What keeps up the heat we do not know, though many theories have been advanced to account for it. The sun certainly gives off heat in enormous quantities, and it may be possible that millions of years hence it will begin to cool and in time lose all its heat. See ASTRONOMY; SOLAR SYSTEM; STARS.

SUNBURY, PA., the county seat of Northumberland County, fifty-four miles north of Harrisburg, on the Susquehanna River and on the Pennsylvania and the Philadelphia & Reading railroads. It is in a lumbering and coal-mining region and has railroad shops, silk, woolen, lumber and flour mills, coffin works, foundries and machine shops. The important structures are the Packer Hospital, the courthouse, the jail and parish houses. Sunbury was settled in 1772, on the site of Fort Augusta and of an old Indian village. It was incorporated in 1797. Population, 1910, 13,770; in 1920, 15,721, a gain of 14 per cent.

SUNDA ISLANDS, two groups of islands south of the Malay Peninsula. The Greater Sunda group includes Sumatra, Borneo, Celebes, Java, Banca and Billiton; the Lesser Sunda Islands are Bali, Lombok, Sumbawa, Flores, Ombai, the Timor group and a number of others. With the exception of a part of Borneo, the islands of both groups belong to the Netherlands. Spices, copra, fruits, coffee, tobacco, sugar, rice and cocoa are exported.

SUN DANCE, a religious ceremony once common among most of the tribes of the Plains Indians of North America. Because of the torturous rites practiced in connection with it, the dance has been forbidden by the United States government. Formerly an entire tribe gathered annually for the ceremony; it was conducted within a circular space enclosed by the tepees of the families assembled, and lasted more than a week. To the sound of drum and singing the stripped and painted performers danced about a

sacred relic for several days without food and with sticks thrust like skewers through their flesh.

SUNDAY. See **SABBATH**.

SUNDAY, WILLIAM ASHLEY (1863-), an evangelistic preacher, popularly known as "Billy" Sunday. Born in Ames, Iowa, and made an orphan by the Civil War, he spent his early years in an Iowa soldiers' home. He was graduated from high school and attended Northwestern University. From 1883 to 1890 he was a professional baseball player, playing on teams of the National League. After his conversion he did Y. M. C. A. work in Chicago from 1891 to 1895, and in 1896 he began preaching, though he was not ordained a Presbyterian minister until 1903. His success has been phenomenal. He has been criticized for his spectacular behavior before his audiences and for his slang; but no one questions his sincerity. His appeal is wide, for his message is easy for the average man to understand—a word of cheer for the fallen, and a call to men and women to practice the simple virtues of honesty and duty to their fellows.

SUNDAY SCHOOLS, or BIBLE SCHOOLS. In 1918 there were in the United States 145,957 Sunday Schools, with an enrollment of 17,715,224 pupils and teachers, and in Canada there were 10,335 schools with an enrollment of 4,040,017. The statistics for the world compiled for the world's convention which met at Zurich, Switzerland, in 1913, showed 310,000 Sunday Schools, with a total enrollment for the world of 27,000,000 pupils, not including 2,850,000 pupils in the Roman Catholic Church.

To Robert Raikes, an Englishman, is due the credit of originating the modern Sunday School, about 1780. Before he died, in 1811, there were 400,000 children in the Sunday Schools of Great Britain alone. The system met with opposition, as it seemed, to some persons, to interfere with the duties of the home and the keeping of the Sabbath, yet in spite of a council of bishops, called to stop the movement, it spread over the world. In 1824 the American Sunday School Union was formed, and through its influence, within ninety years, 125,000 Sunday Schools had been organized and over \$15,000,000 had been expended in distributing Bibles and other religious works.

The first national convention of the Sunday School Union met in New York City in 1832.

In its meeting in 1872 the uniform lesson system was inaugurated. Dr. John H. Vincent, with Mr. Jacobs of Chicago, took the initiatory steps which led to the publication of the *International Series of Lessons*, which were used by most Protestant denominations in the world for more than a quarter of a century, when they began to be replaced by the graded courses which are now very generally used. In 1878 an international convention was organized, which meets once in two years.

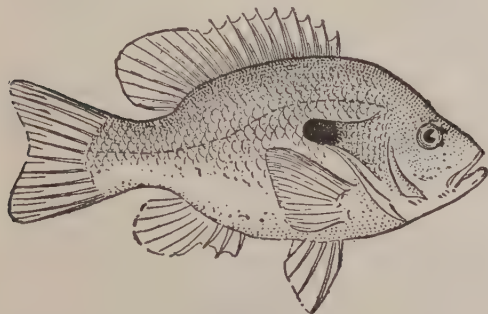
SUN'DERLAND, ENGLAND, a seaport and one of the greatest coal-shipping stations in the world. It is situated in Durham County at the mouth of the Wear, 261 miles northwest of London. Sunderland is one of the most important shipbuilding centers in Great Britain. Its fine harbor is defended by many batteries. Among rich, deep coal mines of the vicinity is the deepest one in existence. There are also extensive shipbuilding works, fisheries, iron works and glass factories. Other industries include the manufacture of earthenware, machinery, chemicals, ropes and anchors and other iron ware. Population, 1921, 159,100.

SUN'DEW, a group of plants so called because the leaves are covered with a sticky fluid which glistens like dew. When a small insect alights on this sticky substance it is held fast and when it dies the soft parts of its body are absorbed by the plant. An American species is the *round-leaved sundew*, the leaves of which are clustered in a rosette. The tall, slender flower stalks bear rows of small, white blossoms. See **VENUS'S FLYTRAP**; **PITCHER PLANT**.

SUN DIAL, an ancient device for measuring time. The dial consists of two parts, the *face*, or *plane*, and the *back*, or *gnomon*. The face, a plate, usually of metal, which is intended to lie horizontally on a standard, is divided into four quarters, each of the four dividing lines pointing to one of the major points of the compass. The gnomon is usually a triangular plate of metal, placed vertically on the plane in a position parallel to the earth's axis and with one of its angles at the center of the plane. At noon the shadow of the gnomon reaches the line on the face pointing north; at six o'clock in the morning it reaches the line indicating west, and at six o'clock in the evening, the line indicating east. Thus, as the shadow travels around the plate, the hour is shown by its position with refer-

ence to the points of the compass indicated. The sun dial is the oldest known device for measuring time.

SUNFISH, a name applied to several groups of widely varying fishes, both marine and fresh-water. The North American fresh-



SUNFISH

water sunfish, never more than ten inches long, is brightly colored. The common sunfish, which is orange-colored and about seven inches long, is abundant in streams and ponds from Canada to Florida. It delights the amateur angler by its energetic manner of biting. The ocean sunfish, which attains a length of several feet, is of grotesque appearance. This variety is unfit for the table.

SUNFLOWER, a genus of plants of the helianthus family, so called because the blossoms with their large seed disks and long radiating yellow petals bore an ideal resemblance to the sun with its golden rays. These flowers, sometimes a foot in diameter, are borne at the top of tall stout stalks, from six to fifteen feet high, which are nearly hidden by large, heart-shaped leaves. The plants are easily grown from seeds, though the roots are perennial. The species are numerous, but almost all are found in North America. The gigantic sunflower common in gardens is a native of Peru. The seeds form an excellent food for poultry and for cage birds; and an edible oil has also been expressed from them.

SUNSTROKE, a term applied to two different ailments resulting from the overheating of the body; *heat stroke*, or *heat fever*, and *heat exhaustion*, or *heat prostration*.

Heat prostration is characterized by great exhaustion, weakness, faintness and even nausea, followed or accompanied by a remarkable fall in temperature. In these cases the temperature of the body should be raised by external applications of heat and by internal stimulants.

Heat stroke, or *sunstroke*, comes on more suddenly than does heat exhaustion. The patient usually loses consciousness and the temperature rises rapidly, often reaching 115° F. The body is flushed and burning hot. In this case, the temperature of the body should be lowered as rapidly as possible, by sprinkling ice water over the chest and body and by rubbing the limbs with ice or ice water. The patient should then be placed upon a bed and wrapped in warm blankets. If the temperature again rises, the same process should be continued, until the body reaches its normal condition.

If during the heated term more care is taken in eating and drinking many fatalities will be prevented. Excesses of all kinds should be avoided, especially indulgence in alcoholic liquors.

SUPERIOR, *soo pé'ri or*, **LAKE**, the largest expanse of fresh water in the world, and the most westerly and most elevated of the Great Lakes of North America. It washes the shores of the state of Minnesota on the west, those of Wisconsin and the northern peninsula of Michigan on the south, and those of Canada on the north and east. Its greatest length is 420 miles, its greatest breadth, 167 miles, and its area, 31,200 square miles. It is 602 feet above sea level, and has a maximum depth of 1,008 feet. In shape it forms an irregular crescent, dotted with numerous islands toward its northern and southern sides. The northern shore consists of cliffs, varying in height from 300 to 1,000 feet, but the southern shore is low and sandy, although occasionally interrupted by cliffs, among which are the fantastic Pictured Rocks, 300 feet high, one of the greatest natural curiosities of the United States. The waters of the lake are remarkable for their transparency and are well stocked with fish, principally trout, whitefish and sturgeon. The region surrounding the lake is rich in minerals, copper and iron being found in abundance.

Lake Superior discharges into Lake Huron by way of Saint Mary's River, an outlet at the southeast. A drop of about twenty feet from the larger to the smaller lake and a series of rapids at the head of the river have made necessary the construction of the Sault Ste. Marie Canal, consisting of a series of locks, four on the American side. Were it not for this canal system, navigation from Lake Superior into the lower lakes would be

impossible. The chief cities on the lake are Duluth, Minn.; Superior, Wis.; Marquette, Mich.; Ashland, Wis.; and the Canadian cities of Port Arthur and Port William. See GREAT LAKES; SAULT STE. MARIE CANAL.

SUPERIOR, WIS., third city in size in the state, the county seat of Douglas County, on Lake Superior and the Saint Louis River, opposite Duluth, Minn., and on the Northern Pacific, the Great Northern, the Chicago and North Western, the Duluth, South Shore & Atlantic, the Chicago, Milwaukee & Saint Paul and the Minneapolis, Saint Paul & Sault Ste. Marie railroads. Together with Duluth, Superior has one of the finest harbors in the world, with a water frontage of more than thirty miles. Immense shipments of grain, coal, iron and copper ore make it one of the foremost ports for tonnage in the world. One of its grain elevators has a capacity of 6,500,000 bushels. Industrial establishments include flour and lumber mills, shipyards, packing houses and manufactories of wagons, furniture and various iron and steel products. The city is connected with Duluth by two railroad bridges and a ferry. It has two public libraries, a state normal school, a business college, two high schools, a Federal building, a Carnegie Library and three hospitals. In the latter part of the seventeenth century the great explorer, Du L'Hut established a trading post here. The town was first laid out in 1853, by a corporation whose leading members were W. W. Corcoran, Stephen A. Douglas, John C. Breckenridge and other distinguished Southerners. It was incorporated as a city in 1889. A commission form of government is now in operation. Population, 1910, 40,384; in 1920, 39,624, a loss of 2 per cent.

SUPERNATURALISM, *su pur nat'u ral iz'm*, a belief in the supernatural; that is, in supernatural, or, more properly, supernormal phenomena, and in divine revelation through it. The doctrine of supernaturalism has been opposed by naturalists and by some scientists, who maintain that miracles are contrary to natural law and therefore impossible. Both the Old and the New Testament are full of supernaturalism, and the Christian religion is one of those which supports belief in divine revelation through supernormal means.

SUPERSTITION, *su per stish'un*, literally that which stands over one. It is a belief that is based on an irrational foundation, with

a mental background of fear or dread, in most cases. Belief in the effect of the moon on the weather, ascribing ill luck to the number thirteen, considering Friday an unlucky day, and belief that the horseshoe and the rabbit-foot bring good luck, are common superstitions of the harmless variety. In rural communities there are people who believe that seed must be planted when the moon is on the increase because the increase of the moon will cause the crops to increase. On the other hand, the same people believe that weeds and other obnoxious plants should be destroyed when the moon is on the wane because its decrease will insure their complete destruction. These beliefs, which some people take seriously and others deride, are among the most common superstitions.

But there are other superstitions of a more serious nature. These are usually associated with religion, and those who hold them are very tenacious of their beliefs. Among superstitions of this sort are belief in dreams, belief in the influence of the heavenly bodies over one's destiny, belief in the influence of the gods, in horoscopes, witches, and the pursuing vengeance of the laws of nature. Such beliefs are usually founded upon fear. Their influence over the individual is such as to affect his mental attitude towards everything that confronts him, and a person so affected usually lives in constant dread.

What constitutes a superstition in the mind of one is a reality in the mind of another; therefore it is impossible to make a clean-cut division between beliefs that are superstitions and those that are not. Formation of the habit of logical scientific thinking is the best means of ridding the mind of superstitions. Moreover, by frequently entertaining certain superstitions as jests, some people come to look upon them as realities. While such people usually become indignant if accused of being superstitious, they look hopefully upon the horseshoe over the door and carefully treasure the left hind foot of a rabbit.

Related Articles. Consult the following titles for additional information:

Alchemy	Magic	Physiognomy
Astrology	Muscle	Spiritualism
Clairvoyance	Reading	Telepathy
Divination	Necromancy	Theosophy
Faith Cure	Palmistry	Trance
Hypnotism	Phrenology	Witchcraft

SUPERVISOR, an elected local officer. In New York, Michigan, and several other states the supervisor is the chief administrative official of a town. The chief county

authority is vested in the board of supervisors, made up of all the supervisors in the county. This type of government has also been adopted, sometimes with modifications, in Wisconsin and other states of the Middle West. In Michigan and Illinois there is a single supervisor for each township; in Minnesota and Wisconsin each township has three supervisors. In Michigan the supervisor is also a tax assessor, and in Illinois he acts as treasurer. In the Southern states, where the county is the unit of local government, the chief authority of the county is wielded by a board of supervisors, each member representing a district.

SUPPLY AND DEMAND. In economics, value is generally considered to be the power given by an article to its possessor to command in exchange for it the labor or the product of the labor of others; one of the chief agencies in determining this value is the law of supply and demand. By this is meant the relation which the quantity of a commodity on hand, with the prospects for its continued production, sustains to the quantity being consumed, with the prospect of continuous consumption. For example, before the outbreak of the World War, woolens and dye-stuffs were manufactured in Europe in large quantities and were imported into the United States in such quantities as to meet the demands of the trade. The prices in these articles varied but little from year to year. So long as these conditions remained uniform the supply and demand were equal and the market was stable. However, with the outbreak of the war the importation of these articles was greatly restricted, and soon ceased altogether. Within a few months the demand for these commodities far exceeded the supply, and their value rapidly increased.

On the other hand, let the demand for a commodity decrease or let some event occur that points clearly to discontinuing the use of the commodity in the near future, and its value will suddenly decrease. New inventions, for instance, render old machines useless, and new discoveries set aside old processes, and in the changes thus brought about, the values of commodities connected with the old methods are changed.

Evidently there can be no absolute standard of value, as there can be no absolute measure of desire or of difficulty; but to avoid rapid and violent fluctuation, values are measured by reference to some one article, that is, an

article is said to be more or less valuable than a given article, according as its possessor would be willing to give more or less of it in exchange for the given article. Usually this article, or medium of measurement of value, is a precious metal and is called *money*. The expression of the value of an article in money is generally called its price. See **ECONOMICS; MONEY**.

SUPREMACY, *suprem'asi*, **ROYAL**, a term which is applied to the authority of the English sovereign over the Established Church of England. Up to the time of the Reformation the Pope had been head of ecclesiastical affairs in England, but in 1534, after the Pope had refused to annul the marriage of Henry VIII and Catharine of Aragon, Henry persuaded Parliament to proclaim him head of the Church. Although during the reign of Mary the Papal authority was again acknowledged, Elizabeth for the second time abolished it, and a new act of supremacy was passed.

SUPREME COURT OF CANADA. The Supreme Court is composed of a chief justice and five puisne (or associate) judges. It is the highest court of appeal and has appellate, civil and criminal jurisdiction throughout the Dominion of Canada. The judges reside at Ottawa, where the Supreme Court holds three sessions each year—the first beginning on the third Tuesday in February, the second on the first Tuesday in May, and the third on the first Tuesday in October. In unusual cases, where the question at issue is of exceedingly great importance, appeal may be allowed from the decision of the Dominion Supreme Court to the Privy Council in England, but the court is intended to be, as far as possible, the court for the final settlement of controversies arising from the operation of the constitutional system of the country. By an act passed in 1891, the Governor-General has authority to refer to the Supreme Court important questions relating to provincial legislation, education or any problems of general public interest.

SUPREME COURT OF THE UNITED STATES, the highest judicial body in the nation and the head of the judicial department, one of the three departments of the government provided by the Constitution (see page 932), the others being the legislative and the executive.

The legislative department enacts the laws, the executive branch puts them into effect

and enforces them, and the Supreme Court interprets them. This means that if there is a possibility that a law has been passed which violates a constitutional provision, the Supreme Court will determine the constitutionality of that law; if it is deemed a violation, in letter or in spirit, the few men who comprise this court will undo the word of over 500 legislators and declare the law null and void. Such vast responsibility can safely be entrusted only to the wisest legal minds; therefore to this learned group only the most profound constitutional lawyers are supposed to be appointed, which fact has given the Supreme Court the reputation of being the most exalted judicial body in the world.

The Supreme Court is at the head of the entire Federal judicial system for the trial of offenses committed against the United States. This single court could not hope to dispose of all the work which such an obligation would impose on it in a rapidly-growing nation; the Constitution therefore provided that inferior courts should be organized to relieve the higher court of the greater part of such detail. These inferior courts are now ninety-three in number, and are called United States District courts. They are located in every state in the Union and in all outlying possessions. Appeals from their decisions reach, first, courts of appeals, presided over by District Court judges, and some may reach the Supreme Court for determination.

Powers of the Supreme Court. The classes of cases falling under the jurisdiction of this court, in addition to determining the constitutionality of laws, are named in the Constitution. In the following paragraphs the words in heavy-face type are quoted from the Constitution; that which follows is explanatory:

All cases affecting ambassadors, public ministers and consuls. These are officials of the general government whose relations are entirely with foreign governments. Therefore the national government instead of a court of the state in which the litigant may reside should have original jurisdiction.

All cases of admiralty and maritime jurisdiction. The high seas belong to all nations and an offense committed thereon naturally should be tried by a court representative of the nation involved.

All controversies to which the United States shall be a party. In cases of this nature the entire citizenship of a country is interested and a national tribunal rather than a state court must decide the issues involved.

All controversies between two or more states. To permit a court in one of the contending states to settle such a controversy would be prejudicial to fair judgment. An outside tribunal is necessary to which all parties may appeal.

All controversies between a state and citizens of another state and to controversies between the citizens of the same state claiming lands under grants of different states, the same reasons apply as in the case last mentioned.

All controversies between a state or the citizens thereof and foreign states, citizens or subjects. If citizens of any state offend a foreign state or its citizens or subjects, the peace and honor of an entire nation are involved rather than the safety of a single state.

Members of the Court. The President of the United States appoints the members of the Supreme Court, with the approval by majority vote, of the Senate. The head of the Court is termed the Chief Justice; the other members are Associate Justices (the term *judges*, often employed, is incorrect). The court has increased in personnel from six members, in 1789, to nine. Members are appointed for life, but they may be removed by impeachment for improper behavior. The salary of the Associate Justice is \$14,500; of the Chief Justice, \$15,000. Any member upon reaching the age of seventy may retire and receive \$14,500 yearly for the remainder of his life, provided he has served ten years.

There have been nine Chief Justices: John Jay, John Rutledge, Oliver Ellsworth, John Marshall, Roger B. Taney, Salmon P. Chase, Morrison R. Waite, Melville W. Fuller, Edward D. White and Wm. H. Taft.

SURABAYA, or SOERABAYA, *soo ra bah'ya*, a seaport of Java, situated on the north coast, opposite the island of Madura and at the mouth of the Surabaya River. The chief buildings are the government house, the mint and storehouses. It has a large and safe harbor, which is defended by strong fortifications. Shipbuilding docks and a naval station are located here. The trade is large, and, next to Batavia, it is the most important commercial center of the Dutch East Indies. Population, 1915, 156,752; of this number 15,000 were Europeans, 20,000 were Chinese and 2,660 were Arabs.

SURGERY, that branch of the healing art which comprises operative measures for the curing of disease. Modern surgery has been developed since the middle of the nineteenth century, or since the discovery of



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UNITED STATES SUPREME COURT

1. Edward T. Sanford
4. James C. McReynolds
7. Louis D. Brandeis

2. Pierce Butler
5. William H. Taft
8. Willis Van Devanter

3. Oliver W. Holmes
6. Joseph McKenna
9. George H. Sutherland

anesthesia. Before the use of ether and chloroform only those operations were performed that were absolutely necessary, in case of accident or to save the patient's life, because the patient could not withstand the pain. The discoveries of Pasteur in bacteriology, the application of these discoveries to surgery and the formulation of the theory of antiseptics by Sir Joseph Lister removed in a great measure the danger of blood poisoning that was the dread of the surgeon as well as the patient. Before Lister's discoveries, fever, abscesses, blood poisoning, gangrene and other diseases were some of the after-effects of all surgical operations. To-day these after-effects have been prevented, and the field of surgery has been broadened until it extends to every organ and tissue in the human body, "from the crown of the head to the tip of the toe."

What Surgery Does. The chief purposes of surgery are to repair injuries caused by accident; to cure disease by removal of affected minor organs or unnatural growths, such as tumor and cancer; to remedy physical defects caused by disease or deformity; to relieve suffering in cases where cure cannot be effected, and in some cases to aid the physician in diagnosis.

Some of the operations and their results are among the greatest triumphs of modern science. Remarkable cures in cases of abdominal diseases have been effected by removing a part or the whole of the diseased organ—as a kidney, the gall bladder or a portion of the intestine. Brain specialists are able to locate tumors, blood clots and other disorders which prevent that organ from discharging some of its functions, and these obstructions are successfully removed. Certain forms of epilepsy caused by disease of the brain have also been cured by operation. The transfusion of blood from the system of a healthy person to that of one who has lost a large quantity of blood by accident, or who is anemic, and skin grafting for the purpose of removing scars, or for the relief of one who has lost skin by a burn, are well-known operations. Crooked limbs are straightened, and healthy organs are transplanted to take the place of diseased parts.

Methods. In operations requiring the use of ether or chloroform, preparation of the patient begins about twenty-four hours before the time set for the operation. The alimentary tract is thoroughly cleansed and

the body bathed with soap and water; then the part to be operated on is washed with a strong antiseptic. Just before the operation this part is again washed with soap and water, followed by the antiseptic. The part is then covered with a sterilized towel until the surgeon is ready to operate. The operating room and everything in it, as well as every one who is to come in contact with the patient, are disinfected. In some cases surgeons and nurses wear antiseptic masks, and most surgeons use rubber gloves that are thoroughly disinfected after each operation. Every precaution is taken to assure the patient a speedy recovery; yet, in major operations, fatalities occur, because the shock to the nervous system is so severe that the patient is unable to overcome it.

History. While modern surgery is of recent development, surgery has been practiced from the earliest times. Herodotus says that the medical art in Egypt was divided into numerous branches, representing each member of the body. The Greeks knew and practiced several important operations, in a mode little behind modern practice. The Romans followed the Greeks and improved upon their methods, besides inventing new operations of considerable difficulty. On the decline of the Roman Empire, the medical art in Europe fell entirely into the hands of the monks, and when, in 1163, the Council of Tours prohibited the clergy from performing any operations, surgery became incorporated with the trade of barber and was reduced to the simplest operations, chiefly that of letting blood. The earliest revival of the science arose from the contact of Europeans with the Eastern nations, particularly the Arabs, and before the close of the eleventh century, Salerno, in Italy, acquired celebrity for a school of medicine. From that time on there was a continual growth in surgical skill and knowledge.

Related Articles. Consult the following titles for additional information:

Amputation
Anesthetic
Antiseptic
Bacteria and
Bacteriology
Bandage

Lithotomy
Medicine
Tourniquet
Transfusion of Blood
Trephining

SURROGATE, a judicial officer who has jurisdiction over the probate of wills, the administration and settlement of decedents' estates. In some states he is empowered to appoint and supervise guardians of infants and other legally incompetent individuals.

In American Law. In some states this official is called surrogate, in others, judge of probate, register, judge of the orphans' court, etc. He is ordinarily a county officer, with local jurisdiction limited to his county.

In English Law. In Great Britain this official is a deputy or substitute of the chancellor, bishop, ecclesiastical or admiralty judge, appointed by him to act in his place, as in granting licenses, in probating wills and granting administration of estates and guardianship. See COURTS; PROBATE COURT.

SURVEYING, *sur vā'ing*, the art of running lines for the purpose of locating boundaries, measuring land and for determining the shape and area of any portion of the earth's surface.

Land surveying, which is confined to small areas, such as that used in measuring land and fixing the sites of buildings and other structures, does not take into consideration the curvature of the earth. *Topographical surveying*, which is on a much more extended scale, is for the purpose of producing maps that will show elevations and depressions of land, the location of bodies of water and other objects. *Railroad surveying* is for locating and determining the course and grades of lines of railway. The purpose of *marine surveying* is to locate shoals and other objects dangerous to navigation, the mapping of the mouths of rivers and entrances to harbors and the determining of depths of water in the courses over which vessels usually pass. Surveying on a large scale is usually under the direction of the national government. It requires a thorough knowledge of mathematics, and the operation of delicate instruments demands a high degree of accuracy.

SURVEY OF PUBLIC LANDS. See LANDS, PUBLIC.

SUSA, *soo'sa*, one of the dead cities of Persia, once the capital of the Persian province of Susiana, or Elam. It occupied a hilly site on a plateau which is to-day known as the province of Khuzistan. The whole section is fruitful and well watered, and excavations show that the city was the site of human habitation even in the Stone Age. After long occupation by Babylonia, Susa first came under Persian rule in the time of Cyrus, and under his successors it became a magnificent city, the chief metropolis of the Persian Empire. When Babylon rose to importance under Alexander, Susa declined. It was still inhabited as late as the Middle

Ages, but is now deserted. It is marked by mounds and a few ruins and a Mohammedan mausoleum known as the Tomb of Daniel.

SUSQUEHANNA RIVER, a river of Pennsylvania, formed by the union of a north and an east branch, which issue respectively from lakes Schuylers and Otsego, in Otsego County, New York. The general course of the Susquehanna is southwest, until it reaches the boundary line of Pennsylvania. From there it crosses the state in an irregular course from north to south. After flowing a short distance through Maryland it enters the head of Chesapeake Bay. There are many important towns along its banks, including Binghamton and Owego, in New York, and Wilkesbarre and Harrisburg, in Pennsylvania. The river is about 500 miles long, and is not navigable.

SUTHERLAND, GEORGE (1862-), an American lawyer and statesman, born in England, educated in Utah and in University of Michigan. He was United States Senator (1905-1917). He is the author of *Constitutional Power and World Affairs*. In 1922 President Harding appointed him Associate Justice of the Supreme Court.

SUTLEJ, a river of India, the most easterly and the largest of the five rivers of the Punjab. Its source is near the sources of the Indus, the Ganges and the Brahmaputra. In the upper part of its course it flows westward through the Himalaya region; then it sweeps along the western foot of the Siwalik Hills, whence it has a generally southwest course until it unites with the Chenab, to form the Panjnad, or Five Rivers. After a course of about fifty miles it joins the Indus. The entire length of the stream is about 1,000 miles. In the upper part of its course it is a mountain torrent, but at Felor it widens into a shallow lake. Up to this point it is navigable for river craft. In the lower part of its course the waters are used for irrigation.

SUTTEE', the practice among the Hindus of burning a widow on the funeral pyre of her deceased husband. It was once general in India (at one time compulsory), but was abolished by the British in 1829.

SWALLOW, *swol'lo*, the general name of a family of birds somewhat resembling the swifts, found in all parts of the world except the coldest regions. They have weak feet and legs, but long and strong wings and remarkable powers of flight. The tail is a

little longer than the rest of the body and usually forked. The birds are exceedingly graceful on the wing, wheeling, dipping, soaring rapidly, skimming along near the surface of water and even drinking in flight. Some swallows are migratory, going near the polar regions in summer. They travel in large numbers, resting at night in woods and marshes. Some build in trees; others build stucco nests on the under side of bridges, in barn rafters and such places. The eggs, four or five in number, are white, sometimes spotted with brown. The North American *barn swallow* is perhaps the swiftest of all flyers. The plumage is blue-gray above and chestnut-colored beneath, and the tail is deeply forked. The *tree swallow*, *cliff swallow* and the *purple martin* are familiar residents of the United States and Canada.



BARN SWALLOW

SWALLOWING, a muscular act, beginning in the mouth. The tongue is raised against the front part of the hard palate, the uvula takes a horizontal position to close the opening into the nostrils, the epiglottis is pressed down upon the glottis, or opening into the larynx, and when the food reaches the back of the throat it is seized by the involuntary muscles, carried quickly through the pharynx, slowly through the esophagus to the cardiac orifice, which opens to allow the food to enter the stomach. A juggler can drink while standing on his head, because swallowing is a muscular act.

SWAMP. See MARSH.

SWAN, *swon*, the largest bird of the duck family, famous for its grace and beauty on the water. Among the Greeks and Romans the swan was venerated as the sacred bird of Apollo and the Muses. It was once thought that the swan sang beautifully just before its death; but as a matter of fact, all swans have harsh and rather unpleasant notes. They are strong, fierce fighters, defending their nests against preying animals and even against man. In North America there are two wild species, the *whistling swan*, which

has an orange spot between the eyes and the *trumpeter swan*, both of them white, with black bills and legs. The latter, which was



SWAN

at one time quite common in the Western United States, furnishes most of the swan's down for the market. Domestic swans are kept only for their beauty. The *black swan* is a native of Australia.

SWEAT. See PERSPIRATION.

SWEATSHOP SYSTEM, an industrial procedure whereby subcontractors undertake work in their own houses or small workshops, employing others to do it, and profiting by the difference between the contract prices and the wages they pay their assistants. As it is the object of the subcontractor, or sweater, to secure as large a margin of profit as possible, the tendency of the system is to reduce the wages of the worker to the lowest possible limit, on what is known as the piece-work basis. The evils of the sweatshop are long hours; an impossible wage scale; overcrowding of shops and tenement houses; unsanitary and unfavorable conditions of work; child labor, often causing disease and deformity due to confinement, filth and improper lighting; and the irregularity of the work.

Much of this sort of sweating has been done in industrial history, but its many evils have been mitigated with the advance of corporations, trades unions, factory inspection and legislation. The system appears in the United States among cigar makers, cloak makers and shop tailors, and it has given rise to strikes, out of which has come temporary relief.

Some states have legislated against the use of dwelling tenements for workshops, the overcrowding of workrooms and the employment of children. Massachusetts, New York, Ohio and Illinois have laws which provide

that all rooms for this work be licensed and regularly inspected. Manufacturers, too, are seeking to alleviate the evil and providing more healthful working conditions and better wages. See FACTORY AND FACTORY LEGISLATION.



Peasant Girl

SWEDEN, a kingdom of northern Europe, occupying the eastern and greater portion of the Scandinavian Peninsula. Russia, the Baltic Sea and the Cattegat and Skagerrak border it on the east, south and southwest, and Norway forms the western and northern boundary. Its greatest length is 940 miles; its greatest breadth is 225 miles, and its area is 172,035 square miles, making it about the size of Montana and Maine combined. The coast line exceeds 1,400 miles in extent.

The People. The Swedes are descendants of the Scandinavian branch of the Teutonic peoples who formerly inhabited the northern part of Europe. They are usually tall and well proportioned and have a light complexion, blonde hair and blue eyes. They are characterized by their industry, sobriety, cheerful disposition and general intelligence. They stand among the foremost of the world's progressive peoples. Wherever they have gone they have won a reputation for honesty and thrift.

The language is somewhat different from that of Norway and Denmark. Because of the union of that branch of the Scandinavians forming the Swedes with the Svears of the north and the Gotars of the South, the blending of the native language of these people with the old Scandinavian tongue produced a language somewhat more sonorous than the dialects found in Denmark and Norway, which very closely resemble each other.

The Lutheran Church is the established Church, and nearly all the inhabitants are followers of this creed. Other religions, however, are tolerated, and there are a few communicants of the various evangelical denominations, as well as some Roman Catholics.

In 1910 the population was 5,522,405; in 1920, 5,903,762.

Surface and Drainage. The Scandinavian Alps, or Kiölen Mountains, form the northern portion of the boundary between Sweden and Norway. These are low mountains consisting in some places of scarcely more than a high plateau. The highest summits are Sarjektjakko, 6,855 feet, and Kaskasatjakko, 6,809 feet. From the mountain barrier the land slopes by successive terraces toward the east and southeast. The coast is low, level and in some places marshy. It is estimated that nearly one-third of the surface of the country is below a level of thirty feet, while only a small portion of it has a level of 2,000 feet and over. The southern part of the country is generally low.

Sweden has a large number of rivers, and with scarcely an exception these flow in a southeasterly direction. The Tornöa and its northern tributary, the Muonio, form the boundary with Russia. Other important streams in their order, passing southward, are the Lulea, the Skelleftea, the Unea, the Indals and the Dal, flowing into the Gulf of Bothnia; the Klar, rising in Norway and flowing southerly into Lake Venner, and the Gota, discharging the waters of this lake into the Cattegat. The country has a large number of lakes. The most important of these are lakes Wenner and Wetter. The former, having an area of over 2,100 square miles, is the third largest lake in Europe. The northern part of the country is studded with lakes, which in form are generally long and narrow. These, as well as most of the streams, are too small to be available for navigation, except near their mouths.

Climate. Considering its latitude, Sweden has a mild climate, though there is a marked difference in the mean annual temperature in its northern and southern extremities, the mean temperature at Stockholm for January being $24\frac{1}{2}^{\circ}$, and for July, 63° . In general the summers are hot, and the winters extremely cold; in the northern part of the country the thermometer sometimes falls as far as 40° below zero. There is scarcely any transition between winter and summer or between summer and winter. Spring and autumn, which characterize most temperate countries, here are very short or are lacking altogether. The rainfall averages about 20 inches for the entire country, but it is much heavier in the south, where it is about 35 inches, than in the north, where it seldom exceeds 13 inches. The greatest amount of rain falls during August.

Mineral Resources. Sweden has rich stores of minerals, and mining is one of the most important industries. Iron ore of excellent quality is distributed over the country, but the mines in the north are the most important. The central part of the country has been noted since earliest times in Swedish history for its production of iron and steel. About 7,500,000 tons of iron ore are mined annually, and about 6,500,000 tons are exported. Copper is extensively mined, and gold, silver, manganese and cobalt are found.

Forests and Lumber. At least one-half of the country is timberland. Dense growths of pine, spruce, birch and mountain ash are found on the uplands. Groves of oak border the lakes in the lowlands, and forests of birch are found in the fertile lowlands of the south. Most of the forests are on Crown lands and are controlled by the government. The largest lumber mills are located on the Gulf of Bothnia, and lumbering and other wood-working industries are of great value. They furnish employment for about 42,000 people.

Agriculture. Only a small portion of the land is suitable for cultivation. A large part of the remainder is covered with forests, and some of the rest is suited to grazing. Agriculture gives employment to about one-half of the inhabitants. The farms are generally small, ranging from five to forty-five acres in extent. The best lands are in the southern and central parts of the country, and here the farms, when well tilled, produce as much per acre as the best farms in England. The chief crops are oats, rye, potatoes, barley, wheat and hay and forage crops.

In the parts of the country where pasturage is good, the raising of live stock is important; here dairying receives the attention of a large number of farmers, and considerable quantities of butter are exported to Great Britain. Sugar beets are cultivated in the south, and flax, tobacco and hops are raised successfully in various localities. Agriculture is aided by the government, which establishes agricultural schools and sends teachers of agriculture throughout the country. Primitive methods are found only in remote localities.

Other Industries. Fishing has always been a profitable industry. Herring are taken in large quantities, and salmon abound in the mouths of the northern rivers, where extensive fisheries are established. Salted

and canned fish are among the leading articles of export. Of the manufacturing industries, those connected with the cutting and preparation of lumber and its products are by far the most important. Other important industries include the manufacture of flour, of textiles and foundry and machine shop products. Sweden is noted for its manufacture of iron, which is exported to nearly all countries of the world. Cream separators, lighthouse apparatus, telephone supplies, motors and electrical machinery are manufactured in various cities and towns. There are porcelain factories at Rostrand and Gustavsberg, and glass factories at Kosta and Rejmyre whose wares have a high reputation in foreign markets. The leading industrial centers are Stockholm, Göteborg and Norrköping, all of which have large textile establishments. The most important iron works are at Eskilstuna and Motala.

Transportation and Commerce. Transportation facilities are good. The roads are in excellent condition, and the country has over 9,400 miles of railway lines, which connect all of its leading commercial centers and join them with the important seaports of Norway. Canals connect many of the lakes and rivers, so that there are over 2,500 miles of inland waterways. All of these means of transportation give the country adequate facilities for moving its products. Telegraph lines extend throughout the country, and in 1921 there were over 413,000 miles of telephone wires, all but 6,247 being owned by the state.

The commerce is large, considering the size and population of the country. Most of it is maritime, and Swedish ships carry not only the trade of the country, but a considerable part of that of other nations. The leading exports are minerals, metal goods and machinery, live stock, hair, hides and other animal products, lumber and its products, which far exceeds the others. The imports consist of minerals, principally coal, metal goods, machinery, textiles, grain, flour and other food products. The foreign trade is carried on chiefly with Great Britain, Germany, the United States, Russia, France and Denmark.

Education. An excellent system of public schools is maintained, under the direct supervision of the government. Attendance is compulsory, and there is scarcely a person of school age who cannot read and write. In addition to the common schools, two univer-

sities are maintained, one at Upsala and the other at Lund. There are also fifteen normal schools and a number of technical schools, including schools of navigation, textiles, mining, medicine, veterinary science, agriculture and forestry. The deaf and blind are cared for in special institutions maintained by the state.

Literature. The earliest writings in Swedish literature which have been preserved are ancient provincial laws, some of which date from the thirteenth century. There are, too, ballads which were written at a very early date. Like the other countries of Europe, Sweden was affected in the later Middle Ages by the romantic movement in literature, and tales of chivalry were the result. In the sixteenth century little was produced except religious works, but in the century that followed Swedish writers began to be influenced by the writers of other countries, and a more varied literature resulted. The middle eighteenth century produced Swedenborg and Linnaeus, who were, however, of more importance to religion and science than to pure literature. Gustavus III was a patron of letters, and many writers of note were members of the court he assembled. The romantic movement which swept over Europe in the early nineteenth century affected Sweden with the other countries, and the first half of that century was the most noteworthy period in the history of Swedish literature. Tegnér (1782-1846), the author of *Frithiof's Saga*, is the greatest poet Sweden has produced. The best known writers of the modern period are Strindberg, the dramatist, and Selma Lagerlöf, the novelist, who in 1909 won the Nobel Prize for literature (see NOBEL PRIZES).

Government. The government is a constitutional monarchy. The throne is hereditary in the male line of descent, but in case there is no direct heir, a king is chosen by the national legislature. The king is required to be a member of the Lutheran Church and is bound to observe the laws and enforce the same. The legislative department consists of a Diet, comprising two houses, the upper chamber of 150 members chosen by the legislators of the various provinces, for eight years, and the lower chamber of 230 members, chosen for four years by universal suffrage. In choosing the members of the lower chamber about one-third are chosen from the towns and two-thirds from the country. The exec-

utive power is in the hands of the king, who acts under the advice of a council of state consisting of eleven members.

Cities. The chief cities are Stockholm, the capital; Gothenburg and Malmö. These are described elsewhere.

History. Authentic history of Sweden begins about A. D. 1,000, but for three centuries after that time the country was in a turmoil, owing to the constant struggles between the two Teutonic peoples, the Swedes and the Goths, who occupied, respectively, the northern and the southern parts of the peninsula. In the twelfth century Christianity spread through the country, and in their attempts to advance the new religion the Swedes made themselves masters of Finland. In 1397, by the union of Kalmar, Queen Margaret united Sweden, Denmark and Norway as one kingdom. The Swedes were restive under the union, but not until 1523, under Gustavus Vasa, were they able to make themselves independent (See GUSTAVUS I).

From this time the nation made a steady advance in the face of difficulties, despite the succession of weak rulers, the first of whom was Eric XIV, who ruled from 1560 to 1568. Under John III (1568-1592) occurred a reaction to Catholicism, from the Lutheranism which Gustavus had established as the State religion. The people showed their adherence to the new religion, however, by demanding the abdication of John's son, Sigismund, who attempted to restore Catholicism as the State faith. Charles IX (1604-1611) did much to counteract the bad effects which the previous reigns had had on the country, and his son and successor, Gustavus Adolphus (1611-1632), brought Sweden to a point which it had never reached before. With all of its growth in patriotism, commerce and culture, Sweden had made no attempt at territorial expansion, and it was not accorded by the other states of Europe a very high position. Gustavus Adolphus was ambitious, and his ambition, with his faith in Protestantism, was sufficient to draw him into the war which was raging in Germany. Even after the death of Gustavus Adolphus, his policy was carried out, and for some time Sweden was recognized as one of the great powers of Europe. Slight accessions of territory were made under several of the rulers by successes in war, but in 1675 the Swedish armies were completely defeated by the elector of Brandenburg at Fehrbellin.

The first great sovereign after Gustavus Adolphus was Charles XII (king from 1697 to 1718), whose extraordinary military genius drew the eyes of all Europe to Sweden. After his death the country became greatly enfeebled by the struggles of various political factions, and even Gustavus III (1771-1792), who put down the factions and increased the royal power, was unable to restore it fully. Finally, Gustavus IV (1792-1809) proved himself so weak, and yet so stubborn, that he was deposed and was compelled to renounce the crown for his heirs. Charles XIII, the uncle of Gustavus, was elected king, and as he had no heirs, Bernadotte, one of Napoleon's marshals, was chosen crown prince, in the hope of conciliating Napoleon. The effectual aid which Bernadotte rendered the allies in the final overthrow of Napoleon gave Sweden a claim on the Congress of Vienna, and Norway was accordingly taken from Denmark and given to Sweden. Barnadotte came to the throne in 1818, and although, because of his selfish desire for his own advancement, he was never personally popular, he greatly increased the prestige and prosperity of his realm. He was succeeded in 1844 by his son, Oscar I, under whom, as under the two succeeding kings, Charles XV (1859-1872) and Oscar II, prosperity continued. In 1905 Norway broke away from Sweden and became an independent country, but maintained friendly relations with Sweden. During the World War Sweden endeavored to maintain strict neutrality, in accordance with a common agreement entered into by the three Scandinavian countries.

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Charles, XII and XIV	Norway (history)
Denmark (history)	Oscar, I and II
Gustave V	Thirty Years' War
Gustavus, I, II,	World War
III, IV	

SWEDENBORGIANS, *swe den bor'je anz*, the followers of Swedenborg, particularly the members of what is called the New Jerusalem Church, or New Church. The belief of the Swedenborgians is as follows: Jesus Christ and God are one, in whom is a trinity, not of persons but of essentials, answering to the soul, the body and the operation of these in a man; that the Scriptures contain an internal or spiritual meaning, which is the Word

existing in heaven; that the key to this is the correspondence between natural and spiritual things, as between effects and their causes; that man is saved by shunning evils as sins and by leading a life according to the ten commandments; that man is a spirit clothed with a natural body for life on earth, and that when he puts off that body at death he continues to live as before, but in the spirit, first in an intermediate state between heaven and hell, but afterwards, when his character, whether good or evil, becomes harmonious throughout, among his like, either in heaven or hell; that the Lord's second coming and the last judgment are spiritual events, which are continually taking place. There are about 9,000 Swedenborgians in the United States.

Emanuel Swedenborg (1688-1772), whose real name was Swedberg, the founder of the New Jerusalem Church, or sect of Swedenborgians, was the son of Jasper Swedberg, bishop of West Gothland, Sweden. He was born at Stockholm. His education was scientific and his first work was that of assessor in the Royal College of Mines, a position he held till 1749, though he retained the salary through life. Swedberg was master of all the scientific knowledge of his time and wrote voluminously on scientific subjects. In 1719 Queen Ulrica raised his family to the rank of nobility, and the name was changed to Swedenborg.

SWEET ALYSSUM, *a lis'um*, a little trailing plant dear to the heart of every gardener. It grows from four to ten inches high, and blossoms from June to September, in long clusters or bunches of small, white sweet-scented flowers, which are much frequented by bees. It is easy to raise, growing in any ordinary soil, either from seeds or from cuttings. One variety has double flowers, another is noted for its variegated leaves; still another, being dwarfed and bushy, is used perhaps more than any other plant for the borders of flower beds.



SWEET ALYSSUM

SWEET BRIER, a name applied to several species of rose, natives of Europe, but naturalized in the United States. Sweetbrier grows wild, but it is often planted in hedges and gardens, on account of the spicy fragrance of its small leaves and pink flowers. It is also called the *eglantine*.

SWEET CLOVER. See MELILOT.

SWEET FLAG, a rushlike plant of the arum family, found in marshy places throughout the northern hemisphere. The leaves are all long and sword-shaped, and the slender, green stem bears a spike of greenish flowers. The root, which is long, cylindrical and knotted, has a strong aromatic odor and a pungent, bitter taste. It has been employed in medicine since the time of Hippocrates. It is also used by confectioners in making candy and by perfumers in the preparation of aromatic vinegar and other articles. See ARUM.

SWEET GUM. See LIQUIDAMBAR.

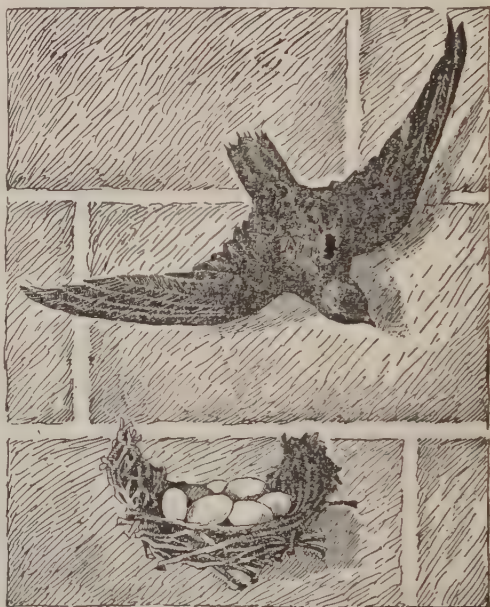
SWEET LOCUST. See HONEY LOCUST.

SWEET PEA, one of the most popular of all garden plants, related to the vegetable of the same name. There are about 150 varieties, belonging either to the climbing or the dwarf type. The flowers, which have a delicate fragrance, are white, pink, blue, red, purple and variegated. Sweet peas require a rich, well drained soil, plenty of sunlight and a free circulation of air. The seeds are planted in April in a trench which should be gradually filled as the plant grows in order to give the roots the necessary depth.

SWEET POTATO, a plant of the convolvulus family, a native of the tropics, but now cultivated in all the warmer parts of the world. Columbus carried sweet potatoes to Spain as a gift to Queen Isabella, and by the middle of the sixteenth century they were in general cultivation in that country. The sweet potato has smooth, creeping stems, heart-shaped leaves and a flower that somewhat resembles the morning-glory. The large root constitutes one of the chief American vegetables. Sweet potatoes are raised in nearly every part of the United States, Georgia, North Carolina, Mississippi and Alabama leading in the production. They are gathered after the first frost.

SWEET WILLIAM, a popular old-fashioned flower, a member of the pink family. The leaves are small, and the velvety flowers, ranging in color from white to dark red and purple, grown in thick clusters. The wild Sweet William belongs to the phlox family.

SWIFT, the common name of a bird, very much resembling the swallow in outward appearance and habits, but in structure much different and classified by some naturalists with the humming birds, and goatsuckers. Like the swallows, the swifts live principally upon the wing, catching insect food and even gathering material for their nests while in full flight. The common North American



CHIMNEY SWIFT

swifts are the so-called chimney swallows, which build their nests in fireless chimneys of houses, sometimes almost filling the cavity with the dried twigs, which are fastened together with a sticky glue, the saliva of the birds. The swifts hunt over a large territory during the day, and at night they return to their home in the chimney, where they move restlessly about, chattering throughout the night. Their tails are spiny-pointed and are used in climbing and propping themselves against walls. The famous edible birds' nest is built by a swift, almost entirely from its own saliva. The *cliff swift* of Guatemala builds a strange nest, about two feet long and two inches in diameter, with a chamber about six inches in diameter at the top, where the eggs are laid. The entrance is at the lower end.

SWIFT, JONATHAN (1667-1745), the greatest of English satirists, born in Dublin. Of his writings, the one most widely read to-

day is *Gulliver's Travels*. His education at Kilkenny and later at Trinity College, Dublin, was irregular, and it was only by a special dispensation that he was granted a degree. In 1689 he became secretary to Sir William Temple of Moor Park, Surrey, but his pride made this relation a trying one, and after five years he gave up the position and returned to Ireland, was ordained and was given a parish in the Irish Church. He shortly became dissatisfied and returned to Moor Park, where he remained until Temple's death. During this time arose his love for the *Stella* of his writings, Hester Johnson, a relation of Sir William Temple's and an inmate of his home. In 1699 Swift accepted an invitation from the Earl of Berkeley to accompany him to Ireland as chaplain and secretary, and through that nobleman he became vicar of Laracor and Rathbeggan.



JONATHAN SWIFT

The famous *Tale of a Tub*, published in 1704, brought Swift wide notice. But its satire on literary and religious pedantry injured his chances for advancement in the Church. In the years following he was prominent in politics, first as a Whig, later as a Tory and editor of the Tory *Examiner*, exerting a powerful influence by his writings. During a stay in England, from 1710 to 1713, Swift wrote the *Journal to Stella*, a work which throws much light on his life. In these years also he became acquainted with Miss Hester Vanhomrigh, called by him *Vanessa*, a young lady of fortune who fell in love with him and proposed marriage. When he returned to Ireland, she followed him and took up her residence in his neighborhood. At length, through secret means, she became aware of his attachment for Stella, and in desperation she visited Stella and demanded the truth. Swift's anger and the rupture of their friendship brought about her death.

In 1724 the publication of the *Drapier Letters*, in which he opposed the granting of a patent for copper coinage in Ireland, made Swift the hero of the Irish people; two years

later the appearance of *Gulliver's Travels* greatly increased his fame. His exertions to better the condition of the poor in Ireland remained constant until 1742, when the affliction which he had long been dreading came upon him, and his mind failed. His insanity continued until his death, three years later.

SWIMMING, a healthful and a pleasure-giving athletic exercise, a knowledge of the art may enable one to save one's own life and the lives of others, but probably not one-third of the boys and girls learn to swim. The chief obstacles to learning to swim are lack of confidence on part of the learner and fear of the mother, whose attitude is expressed by the old saying, "I would be perfectly willing that Johnny should learn to swim if he could learn without going into the water."

Lack of confidence is easily overcome if the beginner does not go into water over his depth, and if he will keep in mind the fact that the human body, as a whole, is lighter than water, but that some parts of it, especially the head, are heavier than water. The deeper one wades into the water, the greater its buoyant force, as one realizes by wading in until the water is up to the neck, when the feet can scarcely be kept on the bottom. However, when the beginner attempts to lie on the surface in water of this depth, it frequently happens that his feet rise and his head goes down, resulting in a "ducking" and sometimes giving him a fright from which he may not recover for some time. It is therefore wiser for the beginner to learn to lie in the water where it is not more than waist deep.

Wading out to this depth, let the beginner face the shore, then lie face downward in the water, extending the arms above the head, keeping the hands open, palm downward. Fully one-half of the head will be in the water and it will be necessary to hold the breath, but this can be done for a few seconds without any inconvenience. If the feet are drawn up quickly they will place themselves on the bottom and the floater can rise to an erect position at will. After a few exercises of this sort let the beginner open his eyes under water and then begin to paddle gently with his hands. He will observe that he is moving towards the shore.

Before attempting the swimming stroke one should be able to float as described above in perfect confidence. When this confidence has been gained, wade into the water up to

the neck, face the shore, lie in the water as before, but keep the head up so that the mouth is out of the water. As you assume this position extend the arms above the head with the hands together, then, turning the hands palm outward, swing the arms outward and backward at the same time, bringing the legs together till the heels touch. Bring the arms back to their former position and spread the legs, and the stroke is completed. In a short time you will be able to take a number of strokes, and when you have reached this stage you have learned to swim. Continued practice will increase facility of movement and also give confidence. Until one can swim some distance with confidence and without exhaustion he should keep out of water beyond his depth.

Diving. The dictionary says that *dive* means "to plunge headforemost into the water," and that is exactly what many do when diving. Every good swimmer will declare that diving, when one has learned the art, is very enjoyable. A good diver makes his plunge from a support high enough to enable him to enter the water in a nearly vertical position. The arms should be extended above the head, and the body while in the air should be straight, with the muscles as free from tension as possible. One will then enter the water easily and emerge quickly.

The inexperienced diver is likely to take his plunge from a support so near the water that he enters on an oblique line. When this happens, the diver suffers more or less inconvenience by having "the wind knocked out of him," when he strikes the water. A person should become a good swimmer before he attempts diving, and he may learn much by careful observation of experienced divers.

Rescuing from Drowning. If a person is in danger of drowning, and a swimmer goes to his rescue, the latter should remember that the drowning person is not apt to be conscious of what he is doing and may seize his rescuer and drag him down. If, however, there is no great excitement, the swimmer can support and carry the other very easily, if the latter will rest his hands upon the hips of the swimmer and, stretching at full length, keep perfectly quiet. This is a convenient method of bringing out any one who is attacked with weakness or cramp. If the drowning person is unconscious, his body

may be drawn along by the hair or pushed ahead of the swimmer, if far from shore; if near, he can be seized by the arm and drawn out. For treatment of the drowned, see DROWNING.

SWINBURNE, ALGERNON CHARLES (1837-1909), an English poet, born in London and educated at Balliol College, Oxford. His first important productions were two dramas. *The Queen Mother* and *Rosamond*, published in 1861. These were followed by the tragedies *Atalanta in Calydon* and *Chastelard* and a volume of verse, *Poems and Ballads*, which excited considerable criticism by reason of the unconventional ideas of morality they contained. Their metrical beauty, however, called for high praise. A series of political poems, including *A Song of Italy*, *Ode on the Proclamation of the French Republic*, *Songs Before Sunrise* and *Songs of Two Nations* reveal an entirely different phase of the author's genius. Among the works of his later years are *Bothwell*, *Mary Stuart*, *Erechtheus*, *Locrine* and *Queen of the Lombards*.

SWINE. See Hog.

SWISS GUARD. The Swiss soldiers are famous for bravery, and for this reason they have often been chosen to serve as body guards of royalty. The Swiss Guard organized to protect Louis XIII was annihilated by the populace in an attack on the Tuileries in 1792. Its heroism is commemorated in Thorwaldsen's *Lion of Lucerne*, carved in the face of a rock at Lucerne, Switzerland. The Swiss Guard organized in 1815 as a body guard of Louis XVIII was overwhelmed in the revolution of 1830. The body guard of the Pope at Rome is made up of Swiss soldiers, but it is called the Papal Guard.

SWINTON, WILLIAM (1833-1892), a famous American historian, was born in Scotland, lived as a boy in Canada, then moved to the United States. He wrote a *History of the World, Twelve Decisive Battles of the War* (Civil War), and other histories.

SWISS FAMILY ROBINSON, a story for children, written by J. R. Wyss (1781-1830), of Switzerland, in the German language. It was afterwards translated into French and then into English, has been accepted as a classic, and has been wonderfully popular for many years. The idea of the plot may have been derived from *Robinson Crusoe*, for the two tales are similar in their development.



SWITZERLAND, a small country of Southwestern Europe, one of the oldest republics in the world, having maintained a republican form of government for 600 years. Situated in the most mountainous part of the continent, it is famous for the grandeur of its scenery. This and the bracing climate attract many visitors. Because of its attractions for pleasure-seekers it has long been called the playground of Europe.

Switzerland has no seacoasts. North of it lies Germany; to the east is the new Austria; Italy and France form the southern and western borders, respectively.

General Features. Switzerland is the most mountainous country of Europe. Glaciers and perpetual snow cover 800 square miles. The dominating feature is the majestic Alpine range, extending across the central and southern parts of the country. Many of the peaks are more than 15,000 feet high. The famous Jungfrau rises two and a half miles above the sea; Monte Rosa, 15,217 feet. Towering to heights slightly less are Mount Saint Gotthard and the incomparable Matterhorn. The curve formed by the Jura Mountains serves as a great natural boundary in the north and west. Here are innumerable parallel ranges rising to heights approximately 5,000 feet. Long valleys lie between, and great gorges cross them, connecting one valley with another. Pine forests cover the slopes; many of the valleys are clothed in verdure and are rich pasture lands. Here and there, pocketed among the mountains, are small lakes and tarns of profound depths. Between the Juras and the Alps lies a great plateau 1,300 feet above the sea. Here the great mass of the population is to be found.

Owing to the melting snows the country is well supplied with water. Most of the valleys are crossed by streams, many of them broken here and there by picturesque waterfalls. The country is drained by the Rhine, the Rhône, the Ticino and the Inn and their tributaries within its boundaries. The only navigable stream is the Aar, a tributary of

the Rhine. The others, while too swift for navigation, are useful in supplying power for manufacturing. The lakes are remarkable for size, depth and beauty. In the southwest and northeast corners of the country respectively lie Lake Geneva and Lake Constance. Lying partly in Italy are Lake Maggiore and Lake Lugano, in the south. Lakes Neuchâtel, Lucerne, Zurich, Bienne, Brienz and Thun are of slightly less importance.

Climate, Plant and Animal Life. The climate of Switzerland is determined by altitude rather than latitude. In the low valleys the mean annual temperature is about fifty degrees Fahrenheit. This is the natural habitat of olives and grapes, of oaks and chestnuts. Higher up are forests of pine, larch, fir and beech, and rich pastures. Grain matures below 4,000 feet. The chief wild animals are the ibex and chamois. In the high valleys the climate is extremely severe. The limit of perpetual snow is about 9,000 feet.

People. The Swiss are a hardy race, noted for their industry, honesty and skill in the arts. They are of Celtic and Teutonic origin; the Teutonic element being more than double that of the Celtic. The latter are in three main groups—the Gallic, who speak French; the Italian, who speak Italian, and the Romanish, whose language is a Latin dialect. German, spoken by about sixty per cent of the people, is the dominating tongue of the northern provinces of Zurich, Bern and Lucerne; French, spoken by about twenty per cent, is the language of common intercourse in Geneva, Neuchâtel, Fribourg, Valais and Vaud.

Although made up of these diverse elements, the Swiss as a nation are one people. The severe test of national unity at the time of the World War served in the end but to intensify patriotism, to quicken the national consciousness. The melting pot of Europe, Switzerland preserves its national unity unimpaired by the activity of opposing forces within it. This is because the Swiss have a traditional passion for liberty, the common possession of which constitutes one great brotherhood among them. Moreover, the land is owned by the people. From the soil both men and women, working together, coax their meager subsistence from generation to generation. Trades pass from father to son. The limited resources have necessi-

tated frugality and thrift and these have engendered stability.

Cities. Since neither the soil nor climate is adapted to agriculture, there is not a large rural population. Most of the people live in the towns, which are thoroughly cosmopolitan. In them the peoples of all the countries of Europe come together. Zurich, with a population of 207,161, is the largest city; Basel, with 135,976, is next in size. Bern, the capital, and Lausanne are also prominent centers. In point of international importance the chief city of Switzerland is Geneva, situated near the French frontier, on the southern end of Lake Geneva, selected as the seat of the league of nations and "capital of the world."

Government. Switzerland is a confederation of twenty-two self-governing cantons, united under a central Federal government. The legislative and executive authority are vested in a parliament of two chambers, the *Ständerath*, or State Council, consisting of forty-four members, two from each canton; and the *Nationalrath*, or National Council, consisting of 189 representatives of the people, chosen by direct manhood suffrage for a term of three years. The two houses hold separate sessions in all legislative matters. In joint assembly they constitute the Federal Assembly (*Bundes-Versammlung*), the supreme government of the republic. This body elects a *Bundesrath*, or Federal Council, of seven for three years, a supreme executive body. The President of the Council, elected to serve one year, is also President of the Republic. The Council also elects a Supreme Court, and the commander in chief of the army. The Federal government can alone contract treaties and declare war. The army, finance, postal system and customs are under its direct control.

For purposes of local government the cantons are divided into districts and communes. With few exceptions each has a legislative and an executive council. The chief executive is called a prefect. In some cantons he is elected by the council of the canton; in others, by popular vote. Civil and criminal law, justice, police, public works and schools are under the jurisdiction of the cantonal authorities. The initiative and referendum have an important place in local legislation.

The neutrality of Switzerland is guaranteed by the Treaty of Vienna (1815) as indispensable to the peace of Europe.

Army. Switzerland has no standing army, but there is a national militia. With few exceptions, every male citizen between the ages of twenty and forty-eight is liable to military service. Exemptions are limited to Federal employes, policemen, clergymen, teachers and those physically unfit, and these pay a certain tax in lieu of service. Men between twenty and thirty-two constitute the *auszug*; those between thirty-two and forty the *landwehr*; those between forty and forty-eight, the *landsturm*. The soldier, on entering the army, is placed in the department of the service for which he seems best fitted—artillery, cavalry, etc. He has about a year's training in one of the recruit schools and afterwards has eleven days' training annually for seven years (eight, if he is a cavalryman). Each man takes home his arms and equipment and is required to keep them in good condition. When not on active duty he reports to the military authorities once a year. Part of Switzerland's army was mobilized at the time of the World War, when there seemed danger that the neutrality of the country would be violated.

Religion and Education. Complete liberty of conscience prevails, Jesuits alone being forbidden to carry on their activities. About fifty-nine per cent of the people are Protestant; forty per cent are Roman Catholics. Jews and non-orthodox make up the remainder. In all the cantons primary education is free; in the northeastern cantons, where the people are mostly Protestant, it is compulsory. In every district there are both primary and secondary schools. There are numerous technical and trade schools, and seven universities, located respectively at Zurich, Bern, Geneva, Fribourg, Basel, Lausanne and Neuchâtel. There is an excellent Federal polytechnic school at Zurich.

Production and Industry. The Swiss mountains, lakes and rivers render one-fourth of the surface unproductive. The lovely scenery, however, offsets this economic loss by attracting thousands of tourists annually; and the entertaining of visitors at the numerous summer and winter resorts constitutes the chief "industry" of the country. Only about ten per cent of the ground is under cultivation; the rest of the production area is covered with forests and pastures, called "alps." The most important products are cheese and condensed milk. Some rye, oats and potatoes are grown, but the bulk

of the foodstuffs are imported. Good wine is made in several cantons. Of domestic animals, cattle are first in importance. Pigs, goats and sheep are raised in large numbers. The lakes supply quantities of fish.

Salt and asphalt are the leading mineral products. Coal is scarce, but the deficiency is in a measure offset by an abundance of water power, and much attention is given to manufacturing. Swiss laces, embroideries, cotton goods and ribbons find ready acceptance in the world's markets. Watches, toys, jewelry and music boxes are widely known for their excellence. Minor industries are wood carving, straw plaiting, tool and instrument making and the manufacture of leather goods. At the time of the World War, Switzerland, in order to obtain necessary food, fuel and raw materials for its existence, guaranteed that (with few exceptions) no imports from one group of belligerents would be exported to an opposing group.

Transportation. Owing to the tempestuous nature of the streams there is little traffic by water. There are about 3,900 miles of railway, practically all of which is owned and operated by the government. Travel by coach and carriage is common, and the roads are kept in excellent condition. The postal and telegraph systems supply efficient means of internal and foreign communication.

History. The earliest inhabitants mentioned in written history were the Helvetians and Rhaetians, who were subdued by the armies of Rome. As a result of German invasions Switzerland was settled by the Alemanni and Burgundians. In the fifth century part of the country came into possession of the Franks. Under Charlemagne's successors the country was divided between France and Germany, but in the eleventh century it passed to Germany, becoming part of the Holy Roman Empire. As a result of the feudal system of the middle ages the Austrian counts of Hapsburg became powerful in the country. Their rule was burdensome and tyrannical, and in 1291 the men of Uri, Schwyz and Unterwalden entered into a defensive league. The union of these three cantons led to a struggle which was to end in Swiss independence.

Open hostilities began early in the fourteenth century, and in the conflicts which followed the Swiss displayed remarkable bravery and heroism. It is to this period that the story of William Tell belongs. In 1315

was fought the Battle of Morgarten, which resulted in a victory for the Swiss and a seventy years' peace. By the middle of the century the Swiss League was reinforced by the addition of five other cantons—Lucerne, Zurich, Glarus, Zug and Bern; and when, in 1386, war again broke out, the Swiss were again able to gain a victory. At the Battle of Sempach (1386), in which Arnold Winkelried deliberately sacrificed his life for the cause of liberty, and at Nafels (1388) the Austrians were overwhelmingly defeated. After this the cantons became the aggressors and wrested Aargau and Thurgau from Austria.

To maintain their independence in spite of the ambitious schemes of Charles the Bold of Burgundy, the Swiss were forced into another conflict, and from this also they emerged victorious. The last war with Austria occurred in 1499. The struggles were severe, but the Swiss again triumphed, and by the Peace of Basel they were politically separated from the Austrian Empire. By 1513 the number of cantons in the federation had increased to thirteen.

Early in the sixteenth century the Reformation, under the leadership of Zwingli and Calvin, began to spread through the country, especially in the northern cantons. The religious differences became so pronounced that war broke out in 1531. The difficulties between the two factions were partially adjusted by the Peace of Westphalia, which closed the Thirty Years' War.

Through the remainder of the seventeenth and the greater part of the eighteenth centuries considerable disorder existed in Switzerland. The religious and political differences of the cantons virtually prevented peaceful growth. In the last years of the eighteenth century the ferment of the French Revolution spread to Switzerland, and in 1798 the ancient confederation was replaced by the Helvetic Republic, which lasted four years. In 1803 Napoleon organized a new confederation, with nineteen cantons, and in 1814, by the Congress of Vienna, the powers acknowledged the independence of Switzerland and guaranteed its neutrality. Again in 1830 and in 1848, Switzerland was affected by the revolutionary movement in France, and a new Federal constitution was introduced in the latter year. This constitution remained in force until 1874, when it gave place to the present constitution.

Switzerland's position as a neutral during the World War was difficult. Its great problem was how to exist; how to obtain from the outside world the fuel, food and raw material on which the nation's life depended. Its next problem was how to remain unified, with its large German, French and Italian elements. The way in which the country overcame its difficulties commanded the respect of the world. In spite of its problems Switzerland conducted a highly-efficient Red Cross service for the relief of the injured.

Related Articles. Consult the following titles for additional information:

CITIES	
Basel	Lucerne
Bern	Neuchâtel
Geneva	Zurich
RIVERS AND LAKES	
Constance, Lake	Neuchâtel, Lake of
Geneva, Lake	Rhine
Lucerne, Lake	Rhône
Maggiore, Lake	
MOUNTAINS	
Alps	Mont Blanc
Jungfrau	Rosa, Monte
Matterhorn	Saint Gotthard
MISCELLANEOUS	
Calvin, John	Saint Bernard, Great
Chillon	Simplon
Mer de Glace	Tell, William
Reformation	Winkelried, Arnold

SWORD, *sohrd*, a weapon used in hand-to-hand encounters, consisting of a steel blade and a hilt, or handle, for wielding it. The blade may be either straight or curved, one-edged or two-edged. The ancient Greek swords were of bronze and later of iron. The Romans had short, straight swords, of finely tempered steel, sharp-pointed and with two cutting edges. When gunpowder was invented and heavy armor was discarded, the rapier came into favor. In the East the weapon most used is the scimitar, having a short, curved blade.

The sword is of much less importance in warfare than formerly, though it is used in all the armies of the world. The Japanese employ a two-edged sword from thirty to thirty-six inches long. The cavalryman of the French, the German and the British army is equipped with a long sword. In the United States army the sword has been replaced by the saber. In the World War hand-to-hand engagements were fought almost entirely with bayonets.

SWORDFISH, *sohrd'fish*, a large salt-water fish found in the Atlantic Ocean and the Mediterranean Sea and, less frequently, in the Pacific Ocean. It has an average length of eight feet and a weight of 250 pounds, though specimens of more than

twice this size and weight have been caught. That part of the fish which gives it its name is the long flat upper jaw, which is sharp-edged and strong and about half the length of the body. With this powerful weapon the fish overcomes its prey—herring, mackerel and menhaden. Even the timbers of ships have been rammed by its "sword." To kill this game fighter with a harpoon is considered fine sport by fishermen. The flesh is coarse, but well flavored.

SYCAMORE, *sik' a mohr*, a tree belonging to the plane tree family, which grows in the United States and Canada from New Brunswick to Florida, as far west as Texas and north into the province of Manitoba. It grows to a height of from seventy to a hundred feet. On the lower part of the tree the bark is brown; above and on the branches it is green and is characterized by a tendency to break off in pieces, exposing a lighter layer of bark underneath. The three-lobed leaves have scalloped edges and deep veins. The stamen-bearing flowers are deep red; the pistil-bearing blossoms are light green touched with red. Sycamore wood, reddish-brown in color, is very durable and is used in furniture-making.

SYDNEY, *sid'ni*, NOVA SCOTIA, the county seat of Cape Breton County, situated on Cape Breton Island at the head of an excellent harbor, 275 miles northeast of Halifax. It is near extensive coal mines, to which it owes much of its prosperity. It is the terminus of the Canadian National and the Sydney and Glace Bay railways. The chief industries are shipbuilding, meat packing and the manufacture of iron and steel. It is the chief town of Cape Breton Island and is a naval station of some importance. Population, 1921, 22,545.

SYDNEY, NEW SOUTH WALES, the capital of the state, the chief naval station and the oldest city of Australia, and next to Melbourne the most important British city in the southern hemisphere. It is the headquarters of the squadron in Australian waters.

Situated on the southern shore of Port Jackson, five miles from the entrance of the harbor, the city has a beautiful site on a land-locked harbor with rocky shores, and it is defended by modern fortifications. The new town is well laid out and contains a number of beautiful public parks and promenades. In the center of the city is Hyde Park, from which the principal streets radi-

ate. The chief structures are the government building, the parliament house, the mint and the city library. The leading educational institution is the University of Sydney, in Victoria Park. Among the churches, the Cathedral of Saint Andrew and the Roman Catholic Cathedral of Saint Mary are worthy of mention. It contains the finest botanical gardens in Australia and the National Art Gallery. The manufactures include machinery, foundry products, cars, locomotives, stoves, boots and shoes, clothing, textiles, tobacco and malt liquors.

The city was founded in 1788 as a penal colony. In 1842 it was incorporated as a city, and after the discovery of gold in the colony, in 1851, it grew rapidly. It is connected by steamship with all the important ports and has an extensive trade. Population, 1917, 764,600, including suburbs (estimated).

SYDNEY MINES, NOVA SCOTIA, in Cape Breton County, on the north shore of Sydney Harbor. The Canadian government and the Nova Scotia Steel & Iron Company's railways furnish transportation. The last named corporation employs nearly 4,000 men in the mines, furnaces and foundries located here. The annual output of coal is over 900,000 tons. Practically the entire population is dependent on the coal mines, blast furnaces, steel plants, foundries and machine shops. Population, 1921, 8,328.

SYENITE, *sy'en ite*, an igneous rock composed of alkali feldspar with hornblende, augite, or mica. It differs from granite chiefly in the lack of quartz. The name is derived from Syene, Egypt, and typical representatives of the group are found in abundance in Saxony, Sutherlandshire (Scotland), the West Alps and Canada. The Norwegian augite syenites are employed as ornamental building stones and for monumental purposes.

SYLLOGISM, *sil'lo jiz'm*, in logic, a form of reasoning or argument, consisting of three parts, the first two of which are known as *premises* and the third as the *conclusion*, which is derived by joining in thought the two premises. Each premise contains two terms, of which one is common to both and is the means of bringing together the other terms. This common element is called the *middle term*. The subject of the conclusion is known as the *minor term*, and the predicate, as the *major term*. Correspondingly, the

proposition containing the minor term is the *minor premise*, and the proposition containing the major term is the *major premise*. In arranging the syllogism, it is customary to place the major premise first. The following is a good illustration of the arrangement and the method of combining the terms in a syllogism:

Autumn comprises September, October and November. (Major Premise.)

In the north central states the pleasantest season is autumn. (Minor Premise.)

Therefore, in the north central states the pleasantest season comprises September, October and November. (Conclusion.)

Here the middle term, *autumn*, brings into necessary connection the minor term, *in the north central states the pleasantest season*, and the major term, *September, October and November*.

There are six rules for the construction of a syllogism:

(1) Every syllogism must have three terms; no more, no less. If there were, for example, four terms, there would be no middle term, and consequently no conclusion would be possible.

(2) Every syllogism must have but three propositions. If there were more than three propositions, there would be more than three terms, and Rule 1 would be violated.

(3) The middle term must be distributed; that is, it must be referred to as a whole at least once in the premise.

(4) No term that is not distributed in one of the premises must be distributed in the conclusion. The error to which disregard of this rule leads is illustrated in the following:

All rabbits are rodent mammals.

No hares are rabbits.

Therefore, no hares are rodent mammals.

Here the major term, rodent mammals, which is not referred to universally in the major premise, is distributed in the conclusion; that is, an assertion has been made concerning the entire class of rodent mammals, namely, that hares do not belong to this class, which is false.

(5) No conclusion can be drawn from negative premises. For example, if A is not B, and E is not F, no inference of the relation between A and F can be made.

(6) If one premise is negative, the conclusion must be negative.

SYMBOL, a sign by which one knows or infers a thing; an *emblem*. It is commonly a definite, visible figure intended to represent or stand for something else. The common *astronomical symbols* are signs conveniently representing such things as astronomical objects, phases of the moon and astronomical terms. Some of these symbols are so ancient that we can find no satisfactory account

of their origin. The symbols for the chief heavenly bodies are as follows: Sun, ☉, Mercury ☿, Venus ♀, Earth ♁ and ⊕, Moon ☾, Mars ♂, Ceres ♁, Pallas ♁, Juno ♀, Vesta ♀, Jupiter ♃, Saturn ♄, Uranus ♅, Neptune ♆, Star ✨. Each asteroid, except those given above, is represented by a circle, with a special number within it. The phases of the moon are indicated in this manner: 🌑 new moon; 🌒 moon in first quarter; 🌓 full moon; 🌔 moon in last quarter.

The mathematical symbols are the symbols used to make operations in mathematics easier. Some are mere signs of value, like the numerals and the letters of the alphabet; others indicate processes, such as +, the sign of addition; −, of subtraction; ×, of multiplication, and ÷, of division. There are also signs of deduction, such as ∴ (therefore), and of aggregation ([]). Besides these, there are the signs of denominate numbers and the special signs used in geometry, trigonometry and the other branches of mathematics, all of which may be easily found in all good text-books on the subjects.

SYNAGOGUE, *sin'a gog*, the central place of worship for a Jewish community. The synagogue is believed to have originated at the time of the Babylonian captivity, in the sixth century B. C. In New Testament times the synagogues were so constructed that the worshipers, as they entered and as they prayed, looked toward Jerusalem. At the extreme east end was the holy ark, containing copies of the Pentateuch; in front of this was the raised platform, for the reader or preacher. The men sat on one side of the synagogue, and the women sat on the other, a partition five or six feet high dividing them. The chief seats, after which the scribes and Pharisees strove, were situated near the east end. The constitution of the synagogue was congregational, not priestly, and the sacred offices were not hereditary, but were filled according to the choice of the congregation. A college of elders managed the affairs of the synagogue and possessed the power of excommunication. The officiating minister was the chief reader of the prayers, the law and the prophets. The servant of the synagogue, who had general charge of the building, acted on week days as schoolmaster to the young of the congregation. The right of instruction was not strictly confined to the regularly appointed teachers, but the ruler of the synagogue might call upon any

one present to address the people; even a stranger might volunteer to speak. The *Great Synagogue* was an assembly, or council, of 120 members, said to have been founded and presided over by Ezra after the return from the captivity. Their duties are supposed to have been the remodeling of the religious life of the people and the collecting and editing of the sacred books of former times.

SYNCOPE, *sin'ko pe*. See FAINTING.

SYNECDOCHE, *sin ek'doh ke*, a figure of speech in which a part of a thing is used for the whole, or the whole for a part. Thus in the expressions, "All hands on deck" and "A fleet of forty sails," the word *hands* is used for men, and *sails* is used to designate ships. *Marble* is often spoken of for a statue, and the word *roof* is used when referring to a house. See FIGURES OF SPEECH.

SYNDICALISM, *sin'dik al iz'm*, a tenet of radical labor organizations having for its object the gaining of control of all industry by bodies of workers, as the control of mines by mine workers, the control of railroads by railroad workers, etc. The name is derived from *syndicat*, a term applied to a labor union in France where syndicalism is especially strong.

Syndicalism seeks the overthrow of present economic conditions, substituting therefor the industrial commonwealth, in which labor shall have control of all the means of production and appropriate to itself all the profits arising therefrom. Syndicalism teaches that there are only two classes in modern society—the capitalists and the laboring classes. There being no bond of sympathy between them, labor can only secure the enjoyment of its rights by the overthrow of the capitalist class.

Syndicalism does not believe that reform can be secured through legislation, neither does it have faith in revolutionary insurrections. It seeks to secure its ends by means of strikes, boycotts and sabotage, and by any other means that will curtail profits and discourage the capitalist class; and finally, when conditions are ripe for the movement, to overthrow the capitalist system by a general strike.

Standard labor unions have no sympathy with syndicalism, and their members are not admitted to syndicalist organizations. Syndicalism has developed considerable strength in France, Italy and some other European countries. The Industrial Workers of the

World (which see), combining some strength in the United States, advocate it. Bolshevism embodies many of the same ideas, to which it adds its own plan of wrecking industry by violence. The movement originated in France in 1892.

Related Articles. Consult the following titles for additional information:

Capital	Sabotage
Bolsheviki	Socialism
Labor Organizations	

SYNGE, *sing*, JOHN MILLINGTON (1871-1909), an Irish dramatist and poet, born near Dublin and educated there at Trinity College. After spending a number of poverty-stricken years on the Continent, he returned to Ireland, where he soon became associated with W. B. Yeats and Lady Gregory in the movement for the revival of the Irish drama and language. His first plays, *Riders to the Sea* and *In the Shadow of the Glen*, produced in 1905, are remarkable for their sense of the overpowering simplicity of tragedy. *The Playboy of the Western World*, though not his best work, is best-known. *Deirdre*, a play based on a classic Irish legend, is undoubtedly his greatest achievement. *The Well of the Saints*, *the Tinker's Wedding*, a few short poems and essays and a volume on *The Aran Islands* are among his other writings. A man of great imagination and remarkable delicacy of style, Synge is by many considered the greatest Irish poet of his time.

SYNOD, *sin'od*. See PRESBYTERIANS.

SYNTAX, *sin'taks*, that division of grammar which considers the arrangement of words to form sentences and the grammatical relations of words in the sentence. In the sentence, "The earth is a globe," the word *earth* is said to be the subject of the verb *is*, and the word *globe* is its predicate complement. The relation of each of these words to the verb is called its *construction*, or *syntax*. Since the subject is a singular noun and the verb is also singular, the latter is used grammatically. If the verb *are*, which is plural, were used, we would say that the sentence contained an error in syntax, or a grammatical error, for verbs must agree with their subjects in number. The study of syntax is thus the foundation of correct usage.

Related Articles. Consult the following titles for additional information:

Adjective	Language and	Participle
Adverb	Grammar	Preposition
Article	Interjection	Pronoun
Conjunction	Noun	Verb

SYNTHESIS, the union of various elements to form a compound. In philosophy,

the term is applied to the process by which a conclusion is reached through the building of a system of reasoning upon certain premises. It is, therefore, opposite to analysis, which consists in finding the elements or facts or characteristics of which a conclusion or notion is composed. In chemistry synthesis consists in building up a complicated compound from certain elements, and in this case, also, it is opposite to analysis, which is separating of a compound into its constituents.

SYRACUSE, *seer'a kuse*, ITALY, the most famous and powerful city of the ancient western Grecian world. It is situated on the east coast of the island of Sicily, thirty miles south-southeast of Catania. The town is built upon the little island of Ortygia, and is connected with the mainland by a mole. Syracuse of the present day is of little importance. The structures of greatest interest are the cathedral, built about an ancient Doric temple, known as the Temple of Diana, a few old palaces, and a museum of antiquities.

Ancient Syracuse, which at one time had over 500,000 inhabitants, was constructed on a high, triangular plateau, with precipitous sides. The colony was founded by the Corinthians under Archias, 734 B. C. It was captured by the Romans, after a three years' siege, in 212 B. C., and continued as a Roman possession until the downfall of the Empire. In 878 the city was destroyed by the Saracens, and the main portion has never been rebuilt. Population, 1921, 64,849.

SYRACUSE, N. Y., the county seat of Onondaga County, situated at the foot of Onondaga Lake, 148 miles west by north from Albany and about the same distance east of Buffalo, on branches of the New York Central and the Delaware, Lackawanna & Western railways. It is also at the junction of the Erie and Oswego canals (see NEW YORK STATE BARGE CANAL). The city is built upon a series of low hills and has a beautiful location. It has a large number of public parks, some of which are only small plots at the intersection of streets; but Burnet Park, on the west, contains over 120 acres, and Lincoln Park, on the east, has about twenty acres. The state fair grounds are also located here. The most important public buildings are the city hall, the courthouse, the Federal building, the new high school, a Carnegie Library, the state asylum for feeble-minded children, the county orphan asylum and the buildings of Syracuse University.

Syracuse is the fifth city in the state in industrial importance. Its industries include the manufacture of clothing, machinery, iron and steel, steel pipe, automobiles and automobile accessories, chemicals, pottery, boots and shoes, agricultural implements and typewriters. Salt is procured from springs on the borders of Onondaga Lake, and the industry has been maintained from the earliest times, though it is now of secondary importance. Near the city are the works of the Solvay Process Company, engaged in the manufacture of soda, coke, tar, ammonia, carbolic acid, nitric acid and other chemicals.

Syracuse is on land formerly occupied by the Onondaga Indians. The locality was visited by a Jesuit missionary in 1642. The first settlement at Syracuse proper was made in 1805, but the town did not reach any importance until after the completion of the Erie Canal. It was incorporated as a village in 1825, and in 1847 it was chartered as a city. Population, 1910, 137,249; in 1920, 171,647, a gain of 25 per cent.

SYRACUSE UNIVERSITY, an institution of higher learning, founded at Syracuse, N. Y., in 1870, under the auspices of the Methodist Episcopal Church. It comprises the college of liberal arts, the college of fine arts, the college of medicine, the college of law, the college of applied science, the teachers' college, the college of agriculture and schools of library training, oratory and photography. It has a graduate department, conferring the master's and doctor's degrees, and it maintains a summer session of six weeks and a table at the marine biological laboratory at Wood's Hole, Mass. An observing station of the United States Weather Bureau was established here in 1902. On the campus there has been erected one of the largest stadiums in the United States. The New York State College of Forestry, a state institution, but a part of Syracuse University, was established in 1911. The university has a faculty of over 320 and an attendance of over 3,500. The library contains about 96,000 volumes and 40,000 pamphlets.

SYRIA, a kingdom in Asia Minor bordering on the Mediterranean Sea and extending eastward to the Euphrates River and

the Arabian Desert. The Alma Dagh Mountains form the northern boundary, and Syria extends to Egypt on the south. The area is estimated at 114,530 square miles, and before the World War the population was estimated at 3,675,000. In the southwestern part of Syria is the region known as Palestine, the scene of the birth, labors and death of Christ. Before the end of the World War Syria was a vilayet, or province, of the Turkish Empire. Its ultimate disposal was left to the decision of the victorious allies, with indications pointing toward the erection of a state under French or British protection (see **WORLD WAR**). The country is populated chiefly by Mohammedans, but Palestine is a great Jewish center. Bedouins and Arabs are found in numbers in the south. The chief towns are Damascus, Aleppo, Beirut and Jerusalem.

Related Articles. Consult the following titles for additional information:

Aleppo	Damascus	Lebanon
Arabs	Jaffa	Mountains of
Bedouins	Jerusalem	Palestine
Beirut	Jews	Turkey

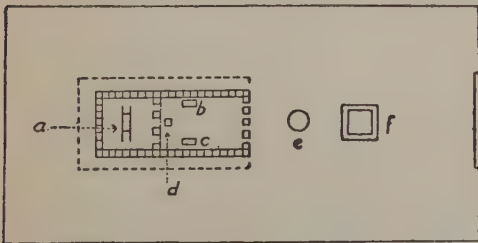
SYRIAC, a dialect or branch of Aramaic, and thus one of the Semitic family of languages. It was a vernacular dialect in Syria during the early centuries of the Christian Era, but it ceased to be spoken as a living language about the tenth century. A very corrupted form of it, however, is still spoken by a few scattered tribes, principally by the Nestorians, of Kurdistan and Persia. Syriac literature had its rise in the first century A. D. At first it was employed in ecclesiastical usage, Biblical translations and commentaries, hymns and liturgies, but in course of time it embraced history, philosophy, grammar, medicine and the natural sciences. The oldest extant work in the language is an incomplete translation of the Bible. The greater part of the Syriac literature has been lost.

SYRINGA, *siring'ga*, a group of hardy shrubs belonging to the olive family, and including the syringa, the lilac and the jasmines, which are described under their titles. The syringa, which is a favorite garden shrub, bears an abundance of single white flowers, noted for their fragrance. It is common throughout the United States and Southern Canada, except in the arid regions.



T, the twentieth letter in the English alphabet, resembles in form the Phoenician character from which, through the Greek and Latin, it is derived, and with which it is identical in sound. In its phonetic value *t* corresponds most nearly to *d*, and the two are often interchanged in related languages. In combinations with *h*, *t* is pronounced in two ways, as in *thought* and as in *this*. When followed by *i*, *t* often has the sound of *sh*, as in *motion*, and in some words it is silent, as in *listen*.

TABERNACLE, *tab'ernak'l*, in Jewish history, the tent of worship in which the sacred utensils were kept during the wanderings of the Israelites in the desert. It was in the shape of a parallelogram, 45 feet long and 15 feet wide, and it was 15 feet high. Its smaller ends were placed east and west, and its entrance was in the east. Its framework consisted of forty-eight gilded boards of shittim-wood, bound together by golden rings and set into silver sockets. The ceiling



PLAN OF TABERNACLE

- a. Ark in the Holy of Holies.
- b. Table of show-bread.
- c. Golden candlestick.
- d. Altar of incense.
- e. Laver, or basin for washing.
- f. Altar of burnt offering.

and walls were covered with a curtain of linen, made in ten pieces. Outside this was a curtain of goats' hair, made in eleven pieces. Over this covering was thrown one made of skins.

The interior of the tabernacle was divided by a curtain into two compartments, the outer, the "sanctuary" proper, and the inner, the *holy of holies*. In the sanctuary was placed, on the north, the table of show-bread; on the south, the golden candlestick, and in the middle, near the inner curtain, the altar of incense. In the center of the holy of holies stood the ark of the covenant.

The tabernacle was situated in a court 150 feet long and 75 feet wide, surrounded by costly screens 7½ feet high, supported by pillars of brass 7½ feet apart, to which the curtains were attached by books and fillets of silver. In the outer, or eastern, half of the court stood the altar of burnt offering, and between it and the tabernacle itself was the laver, at which the priests washed their hands and feet before entering the sanctuary.

On the first day of the second year after the Israelites left Egypt, the tabernacle was dedicated. During all their wanderings a cloud rested on it by day, a pillar of fire by night. The Levites had charge of it, taking it down and putting it up at the various stopping places. The tabernacle lost its value and glory after the Philistines captured the ark. From Shiloh it was removed to Nob and then to Gibeon, whence it was taken to Jerusalem at the time of the dedication of Solomon's Temple.

TABERNACLES, FEAST OF, an autumn festival of the Jews, to commemorate the time when their forefathers dwelt in tents during their sojourn in the Wilderness; it was also a feast of thanksgiving for the harvest and the vintage. The time of the festival fell in the autumn, when all the chief fruits were gathered in, and hence it is often called the "feast of the ingathering." Its duration was strictly only seven days, but it was followed by a day of holy convocation of great solemnity. During the seven days the

people lived in booths erected in the courts of houses, on the roofs and in the court of the Temple. With the final destruction of the Temple, the services attending this, the most joyous festival of the year, have since been conducted in individual synagogues, where a booth decorated with the harvest offerings is built upon the altar.

TABOO', a word used to indicate any object which by religious command may not be touched. The art and the practice were most common in the South Sea Islands. The taboo is applied not only to things with which, because of their evil nature, it is unsafe to come in contact, but also to things which are sacred. Thus, the person of the chief or king is usually tabooed, as is any piece of consecrated ground. In former times, in Polynesia, where the taboo was most in force, the penalty for breaking it was often death; in minor cases, the penalty was a confiscation of the goods of the guilty man. Of course, the practice was much abused, for it gave a priest or chief almost unlimited power over his people and enabled him by pronouncing a certain object tabooed, to gain possession of it for himself.

Taboo may be permanent or temporary, individual, private or public. When an individual is under taboo, whatever he may touch likewise becomes tabooed. The practice of private or public taboo is also noteworthy; as, a river is tabooed until the fishing season is over, a wood until the game is caught, or a field until the harvest is gathered.

TABOR, *tah'bor*, MOUNT, the most conspicuous and famous mountain in Galilee, situated in the northern part of Palestine, on the shores of the Sea of Galilee. It rises almost abruptly from the plain of Esdraelon to a height of about 1,000 feet, and it forms nearly a perfect cone. The altitude of the summit above sea level is about 1,850 feet, which affords an inspiring view of Galilee, Samaria and Perea, with their quaint villages, cultivated fields and water courses. Recent excavations show that the sides of the mountain contain many remains of ancient structures. As early Christians believed Tabor to have been the scene of the Transfiguration of Christ, it became the site of churches and monasteries as well as the object of many pilgrimages. A fortified town centuries before the time of Christ occupied its summit.

TABRIZ, *tah breez'*, PERSIA, the most important commercial center of Northwestern

Persia and second largest city of the country. During the World War it was captured by the Turks in June, 1918, and held by them until the close of hostilities.

Tabriz is situated on an elevation about 4,500 feet above the sea, thirty miles east of Lake Urumiah. It is surrounded upon three sides by hills. Many ruins attest the destruction caused by earthquakes. The inner section of the city is unattractive, despite its numerous mosques and well-stored bazars, but the suburbs are beautified by gardens and orchards. Much of its former commerce has been diverted to ports on the Caspian Sea, although it still enjoys a good trade in rugs, shawls and dried fruits. The rugs of Tabriz are counted among the finest of Persian rugs (see RUGS). Its leading articles of export are grapes, shawls and rugs. Population estimated at 200,000.

TACHE, *tash a'*, ALEXANDER ANTONIN (1823-1894), a Roman Catholic archbishop, born at Rivière du Loup, QUE., educated at St. Hyacinthe College, Montreal Theological Seminary and Chambly College. He became instructor of mathematics in St. Hyacinthe College in 1842, but resigned in 1844 to become a novice in the Order of the Oblate Fathers. He volunteered for missionary service among the Indians in the Red River Valley, and after an arduous journey reached



ARCHBISHOP TACHE Saint Boniface, in August, 1845, two months after he had left his home on the Saint Lawrence. A great-great-grandson of Louis Joliette, and with the blood of Sieur Varennes de la Verandrye in his veins, it was natural that Taché should become a path-breaker. He was ordained a priest three months after his arrival at Saint Boniface, and soon became known throughout the great west for his zeal, fortitude and real friendship for the Indians, over whom he acquired remarkable influence.

In 1851 he was consecrated Bishop of Avath, after having been summoned to France by the Superior of the Oblate Fathers. In 1852 he returned to the Northwest and a year later became Bishop of Saint Boniface. He urged upon the government the necessity of adjusting the grievances of the Indians

and half-breeds in 1869, but during his absence in Italy in 1870 the Riel rebellion broke out. Taché hurried home, and was instrumental in securing peace. Had his advice been followed, trouble could probably have been averted. In 1871, Saint Boniface was made the metropolitan see, and Taché became archbishop of Manitoba. He died at Winnipeg, and was buried in the Cathedral of Saint Boniface.

TACITUS, *tas'e tus*, PUBLIUS CORNELIUS (about 55—about 115), a Roman historian, one of the greatest of all times. Of his education and early life little is known further than the limited facts gleaned from his occasional reference to himself and from a series of letters written to him by his friend and contemporary, the younger Pliny. Under Titus, by whom he was treated with distinguished favor, he became quaestor or aedile; he was praetor under Domitian, and he was consul under Nerva. In 78 he married the daughter of Gnaeus Julius Agricola, the celebrated statesman and general, whose life he afterward wrote. During several years' absence from Rome on provincial business, he probably gained his knowledge of the German people, which formed the basis of his *Germania*. After his return to Rome he lived in the closest intimacy with the younger Pliny. He had a very extensive law practice, and acquired a great reputation as an orator.

Four of his works are still extant: his *Annals*, in sixteen books (of which volumes seven to ten, inclusive, are lost), presenting an account of the principal events in Roman history, from the time of the death of Augustus to that of Nero; *Histories*, of which only four books and a part of the fifth are extant, treating of the year 69 and a part of 70; *Germania*, an account of the geography, manners and institutions of the various German tribes; and *Agricola*, a masterpiece of biography. His style is characterized by conciseness, variety and poetical coloring.

TACKING, in navigation, an operation by which a ship is enabled to beat up against a wind, by a series of zigzag courses, the sails being turned obliquely to the wind, first on one side and then on the other. *Going about* is another term for tacking; while the change is in progress the vessel is said to be *in stays*. See SAILBOAT AND SAILING.

TACOMA, *ta ko'mah*, WASH., third in size among the cities of the state, is the county

seat of Pierce County, twenty-eight miles south of Seattle, at the head of Commencement Bay, on Puget Sound and on the Northern Pacific, the Chicago, Milwaukee & Saint Paul and the Great Northern railroads and the Oregon & Washington Railroad & Navigation Company. The city has one of the finest harbors in the world and a beautiful location along the bay. The snow-capped Olympic Mountains stretch along the west, and Mount Ranier, locally known as Mount Tacoma, rises to a height of over 14,000 feet on the southeast. The Puyallup River empties into the bay here and helps to form the spacious harbor. Many steamship lines connect the city with all parts of the world.

The city is near one of the richest farming regions of the Northwest, containing, also, valuable timber lands and extensive coal mines. Along the harbor are many large electrically operated coal bunkers and immense grain elevators. In the exportation of wheat, Tacoma is one of the largest ports on the Pacific coast; the other leading articles of trade are flour, lumber, fish and fruit. There are over 400 factories; the chief industries are connected with lumber and lumber products; other large industrial plants include flour mills, foundries, car and machine shops, smelters, refineries, shipyards, and manufactories of furniture, wagons and various other articles. There are large railroad repair shops.

The city is an important educational center. Here are the College of Puget Sound, Pacific Lutheran University, Whitworth College, Annie Wright Seminary and several important Roman Catholic schools. The public high school has a manual training department; a Carnegie Library and the Ferry Museum of Art are also important educational features. There are two large parks, Wright and Point Defiance, the latter containing about 660 acres; there are nearly 1,100 acres in parks. The state hospital for the insane is located a few miles southwest, and the city also contains three hospitals and an orphanage. Other important structures are a city hall, a courthouse, a chamber of commerce, the Union Club House, a Federal building, the Northern Pacific Railway building, the Tacoma Hotel and several metropolitan office buildings and the high school. The place was settled about 1869. It was made the terminus of the Northern Pacific Railroad in 1873 and was organized as a city ten

years later, by the consolidation of New Tacoma and Old Tacoma. The city more than doubled its population between 1900 and 1910. Population, 1910, 83,743; in 1920, 96,965, a gain of 16 per cent.

TACONIC, *ta kon'ik*, **MOUNTAINS**, a range of mountains forming a part of the boundary between New York and Massachusetts and extending northward into Vermont where they connect with the Green Mountains (which see). The Taconic range is an eastern extension of the highlands of the Hudson. The mountains are low, with rounded tops, and their sides are generally covered with forests or cultivated fields.

TADPOLE, the larval form in the life history of the frog or toad. After it hatches from the egg, it first looks like a mass of dark jelly with a head and a tail. Gills, eyes and mouth soon develop. In a short time the lungs replace the gills; the tail is absorbed and in its stead legs appear. This last stage marks the end of the tadpole metamorphosis and beginning of the mature period of development. See **FROG**.

TAFFETA, a term which has been applied to various kinds of plain silks, but designates to-day a specific variety, which is thin, glossy and of a fine, plain weave, distinguished from grosgrain, corded silk, and from surah, twilled silk. The name is derived from a Persian word *taftah*, meaning *spun* or *woven*. Taffeta has the same appearance on both sides.

TAFT, **LORADO** (1860-), an American sculptor, teacher and lecturer, born at Elmwood, Ill. In 1879 he was graduated from the University of Illinois, and in the following year went to Paris, where he studied for three years at the Ecole des Beaux-Arts. In 1886 he settled in Chicago, his present home, where he became instructor in sculpture in the Art Institute and lecturer in the extension department of the University of Chicago.

One of the most widely known of his sculptures is a symbolic group, "The spirit of the Great Lakes," on the south façade of the Chicago Art Institute. He also designed the Fountain of Time for the Midway Plaisance of the World's Columbian Exposition. Other notable works include the *Washington Monument*, Seattle; *Columbus Memorial Fountain*, Washington, D. C.; *The Blind*, suggested by Maeterlinck's drama of that name; and *The Solitude of the Soul*. He is

the author of the *History of American Sculpture*, and *Modern Tendencies in Sculpture* (1921).



TAFT, **WILLIAM HOWARD** (1857-), an American jurist and statesman, the twenty-seventh President of the United States. His career is a good example of the manner in which popular feeling regarding a public official rises and ebbs. No President ever began his service higher in the esteem of the people, or with a finer record of constructive achievement. Yet it was his misfortune to lose

his hold upon large numbers of his admirers early in his administration, and to be overwhelmingly defeated in his contest for reelection. On the other hand, in the years following his retirement from the Presidency he regained the confidence he had lost, even in the cases of some of his bitterest political foes of a former day.

Taft's fall from popular favor may be attributed largely to his conservatism in a period when progressive and even radical tendencies were the order of the day. He believed in making progress slowly, while the people, who had for years been stirred and inspired by the dynamic Roosevelt, were disinclined to admire deliberation. It was unfortunate, too, that Taft preferred to work in harmony with a faction of the Republican party which did not represent the best ideals of the mass of voters. Future historians, however, will probably write down his administration as constructive and forward-looking, and of the man himself they will say that he ranks high among those who have helped to make America a great nation.

Early Life. William Howard Taft was born on September 15, 1857, at Cincinnati, Ohio, of New England ancestry. His father, Alphonso Taft was one of the most distinguished citizens of the city, who became a judge of the Cincinnati superior court, and was appointed successively Secretary of War and Attorney-General by President Grant in 1876. The son attended the public schools of his native city and entered Yale University in 1874, from which, four years later, he was graduated second in a class of 121. In 1880

he ranked with one other for first honors in the graduating class of the Cincinnati Law School, and the same year was admitted to the Ohio bar. The children of the future President are of the same intellectual caliber; his eldest son, Robert, was graduated in 1913 with highest honors at the Harvard Law School, and his daughter, Helen Herron, was appointed dean of Bryn Mawr College in 1917.



WILLIAM HOWARD
TAFT

Lawyer and Jurist. Before he began the practice of his profession Taft worked for a time as law reporter for the *Cincinnati Times*, owned by his half brother, Charles P. Taft, and later for the *Cincinnati Commercial*. In 1881 he became assistant prosecutor of Hamilton County, and from that time his advance was rapid. By 1887, seven years after his graduation from law school, he had reached the dignity of judge of the Cincinnati superior court, and in 1890 was appointed Solicitor-General of the United States by President Harrison. As Solicitor-General he was called upon to represent the government in several cases of major importance, such as the one involving the Bering Sea fisheries dispute and the test case regarding the constitutionality of the McKinley Tariff Act.

This act had been passed under a new ruling by Speaker Reed, whereby members present in the House were counted as present whether they voted or not. It had been the custom of the opposition to block legislation by creating a state of "no quorum," for members not voting had hitherto been counted absent. Taft argued that such tactics made null and void the clause giving the House the right to compel the attendance of absent members. His contention was sustained by the Supreme Court, and the new ruling of the Speaker was permanently established. For the period between 1892 and 1900 Taft served as judge of the sixth circuit of the newly-created Federal Court of Appeals, established to lessen the burdens of the Supreme Court. In this interval he was called upon to hand down decisions of far-reaching influence, especially in cases involving corporations and organized labor.

Governor of the Philippines. Judge Taft had long been a national figure, when, in 1900, President McKinley appointed him head of the civil commission to preserve order in the Philippine Islands, recently ceded by Spain. The choice was widely approved. The commission, after a thorough investigation, restored civil government on July 4, 1901, and its chairman became the first civil governor. Governor Taft's record as colonial administrator added greatly to his popularity and reputation. Under his guidance a government was organized, roads were built, sanitation was introduced, schools, banks and postoffices were established and the good will of the natives was won. To settle the difficulties arising from the disposal of the friars' lands, Governor Taft made a personal visit to Pope Leo XIII, and successfully arranged for their purchase.

Secretary of War. In 1903, while he was still engaged in these important tasks, he was offered a place on the Supreme Court by President Roosevelt. To his regret Governor Taft felt obliged to decline an office entirely to his liking—partly because he knew his work was unfinished, and partly because the people of the islands begged him to remain. A year later, however, he was in a position to accept a place in Roosevelt's Cabinet as head of the War Department, to succeed Elihu Root. The President and his Secretary of War were fast friends and worked in admirable harmony. In 1906 Taft helped the Cuban government settle its internal difficulties by acting temporarily as governor of the island republic, and a year later he established American government in the Panama Canal Zone and visited the Philippines to be present at the first session of the Philippine Legislative Assembly.

Election to the Presidency. President Roosevelt, whose outstanding influence as a party leader was undisputed, was chiefly responsible for the nomination of Secretary Taft as Republican candidate for the Presidency in 1908. He checked the popular movement for his own reelection by declining to be a candidate for a third term, and threw all his influence to his distinguished Cabinet official. Taft was undoubtedly the most popular candidate next to the President himself, and he won both nomination and election easily. James S. Sherman of New York was the candidate for Vice-President. The Republican ticket won over the Democratic by

Administration of William Howard Taft, 1909-1913

THE PRESIDENT

- (1) Birth
- (2) Parentage
- (3) Education
- (4) As a lawyer and judge
- (5) Administrative positions
- (6) Character

II. GOVERNMENTAL AFFAIRS

- (1) Domestic
 - (a) Payne-Aldrich tariff
 - (1) Passed by special session of Congress
 - (2) Not satisfactory, many duties being high
 - (b) The insurgent movement in Congress
 - (1) In the House
 - (a) Changes in the rules
 - (b) Lessened power of the Speaker
 - (2) In the Senate
 - (a) Control by the regular leaders destroyed
 - (c) Commerce Court established
 - (d) Establishment of the Postal Savings system
 - (1) A bank of deposit
 - (2) Pays interest
 - (3) Savings accounts only
 - (e) Conservation a national issue
 - (f) Federal tax on corporations
 - (1) On profits above \$5,000
 - (2) One per cent
 - (3) Annual reports required
 - (g) Investigation of important questions
 - (1) Aldrich Monetary Commission
 - (2) Tariff Commission
 - (h) Prosecutions under the Sherman Anti-Trust Law
 - (1) Dissolution of the "tobacco trust"
 - (2) Dissolution of the Standard Oil Company of New Jersey

- (i) New Mexico and Arizona admitted as states
- (j) Children's Bureau created
 - (1) To study conditions
 - (2) To improve them
- (k) Parcel Post established
- (l) Sixteenth Amendment adopted; seventeenth Amendment proposed

(2) Foreign

- (a) Fisheries dispute with Great Britain arbitrated
- (b) Reciprocity with Canada
 - (1) Approved by United States
 - (2) Rejected by Canada
- (c) Treaty with Russia annulled

III. INTERNAL AND LOCAL AFFAIRS

- (1) The President's tour of the West in defense of his policies
- (2) The elections of 1910
- (3) Hudson-Fulton Celebration in commemoration of
 - (a) 300th anniversary of discovery of the Hudson River
 - (b) Centennial of Fulton's "Clermont"
- (4) Champlain Ter-centennial Celebration
- (5) Dedication of the Roosevelt Dam
- (6) Political changes
 - (a) Movement towards reform and reorganization
 - (b) Formation of the Progressive party
- (7) Election of 1912

Questions on Taft

- When was President Taft born?
 From what college did he graduate?
 What public offices did he hold before he became governor of the Philippines?
 Give an account of his work in the Philippines.
 What Cabinet position has he held?
 Describe the parcel post.
 What was the character of the Payne-Aldrich tariff?
 What states have been admitted since 1909?

1909 TAFT'S ADMINISTRATION 1913



SIXTEENTH AMENDMENT PROVIDING FOR INCOME TAX.
SEVENTEENTH AMENDMENT PROPOSED FOR DILUTION OF SENATORS



ROOSEVELT DAM COMPLETED

PRINCIPAL EVENTS

1909

Hudson-Fulton Celebration
Fyffe Aldrich Tariff Law

1910

Commerce Court Established
Fishes Dispute with Great Britain Ended
Glacier National Park Created

1911

Postal Savings Banks in Operation
Canadian Reciprocity Law Rejected by Canada
Roosevelt Dam Completed

1912

New Mexico and Arizona Admitted
Formation of Progressive Party
Children's Bureau Organized

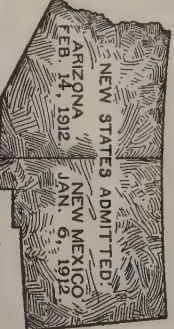
1913

Parcel Post in Operation
Department of Labor Established
16th and 17th Amendments



NATIONAL PROGRESSIVE PARTY ORGANIZED
ITS EMBLEM: THE MOOSE

PINE ALDRICH TARIFF LAW PASSED 1909.
A PROTECTIVE TARIFF



NEW STATES ADMITTED:
ARIZONA FEB. 14, 1912.
NEW MEXICO JAN. 9, 1912.



SCENE IN NATIONAL GLACIER PARK

LOCATION OF NATIONAL GLACIER PARK

FIVE MORE STATES ADOPTED WOMAN SUFFRAGE - SEE PAGE 173

an electoral vote of 321 to 162. Taft had about 1,260,000 more popular votes than his rival, William J. Bryan.

Administration. *Domestic Affairs.* When President Taft commenced his term he was thought to be wholly in sympathy with the policies of Roosevelt, and to favor the element in the Republican party which was generally known as progressive. There was another faction in the party which believed in more conservative policies, and the opposition between the two elements increased noticeably within a few months. It was not long before the public began to feel that the President was working away from the progressives. One of his first official acts was to call a special session of Congress to revise the tariff. The result was the Payne-Aldrich Law, which greatly disappointed the country in general, in that it did not "revise downward" to any extent. The passage of this law and the President's subsequent defense of it in a speech at Winona, Minn., reacted strongly against him, as did his neutrality in the fight against Cannonism and his refusal to take a stand against his Secretary of the Interior, Richard Ballinger, in the latter's controversy with Gifford Pinchot.

Ballinger and Joseph G. Cannon were prominent conservatives, or "stand-patters." Pinchot, who was head of the Forestry Bureau, charged Secretary Ballinger with irregularities in granting claims to Alaskan coal lands and with other violations of the Roosevelt conservation policies. In January, 1910, after Pinchot had appealed to the Senate over the President's head, the President removed him for insubordination, and though Ballinger was subsequently exonerated by a Senatorial committee, the public generally sided with Pinchot.

In the fight on Cannon, who was Speaker of the House, the issue between the progressives and conservatives was so clearly drawn that the progressive sentiment of the country was disappointed when the President refused to encourage the efforts made to change the rules of the House. The progressives won their fight to deprive Cannon of some of his autocratic power, but without the President's help, and, apparently, without his sympathy. These events had sufficient influence to cause a Democratic victory in the Congressional elections of 1910. In 1911 the new Congress passed several tariff reform bills, which were promptly vetoed.

In the meantime some very excellent measures were passed. In 1910 the postal savings bank system was established; in the same year a Commerce Court was organized, and the Interstate Commerce Commission was given enlarged powers. In 1912 the Children's Bureau was organized in the Department of Commerce and Labor; this department was divided in 1913 when the new Department of Labor was created. One of the most popular measures of the entire administration was the act providing for a parcel post (August, 1912). This was an innovation which the public had been demanding for years.

Other notable measures and events include the adoption by Congress of the Sixteenth and Seventeenth amendments (the latter effective in Wilson's administration), providing for the levying of income taxes and the direct election of Senators; the creation of Glacier National Park; the admission of Arizona and New Mexico as states; the completion of the Roosevelt Dam; the passage of an act providing for publication of campaign contributions in national elections; and the addition of five states to the list of full suffrage states. In dealing with trusts the administration fully adhered to the policy established by Roosevelt. Suits were brought against scores of trusts, and the Standard Oil and tobacco combines were ordered dissolved by the Supreme Court.

Foreign Affairs. There is no doubt that in the conduct of international relations the Taft administration deserves high praise. The President worked zealously for reciprocity and arbitration treaties, though the results were somewhat disappointing. Arbitration treaties with France and Great Britain, ratified by the Senate in 1912, were so modified by that body that the President would not submit them to the governments in question. A reciprocity treaty negotiated with the Canadian government was defeated in Canada by vote of the people. The principle of arbitration was upheld, however, in the settlement of the Atlantic fisheries dispute with Great Britain. A new diplomatic policy was also inaugurated, that of creating international good will for the United States through the agency of trade and commerce. An example of this so-called "dollar diplomacy" was Secretary of State Knox's suggestion to American bankers to participate in an international loan to China. In 1912 he made a

tour of the Latin American countries in order to bring about closer commercial and political relations between those countries and the United States, and was cordially received everywhere. Toward the close of the administration disturbances in Mexico in connection with the Huerta revolution caused anxiety for the safety of Americans along the border, and 15,000 troops were sent there as a precautionary measure. The President refused to recognize the Huerta government, and the same policy was followed by the next administration.

The Republican Split of 1912. As has been intimated, a revolt against President Taft by the progressive Republicans had gained great headway by the close of 1910. That year Ex-President Roosevelt returned home from his African hunting trip, and a movement to have him resume his political leadership soon began to take form. Senator La Follette of Wisconsin was the avowed candidate of the progressives, but his physical collapse and limited popularity checked the movement in his behalf. Early in 1912 seven state governors issued a joint letter to Roosevelt urging him to become a candidate. The question of the nomination was fought out in several states in the primaries, in the majority of which Roosevelt was successful. He was, however, unable to control the nominating convention, as the committee on contests and the convention chairman, Elihu Root, were a part of the Taft organization. Claiming "fraud" and a "stolen nomination," the Roosevelt delegates withdrew from the convention hall, the Chicago Coliseum, and held a protest meeting in another hall, nominating their candidate by acclamation. Later in the summer Roosevelt and Governor Johnson of California were formally nominated by the new Progressive party convention (for other details see ROOSEVELT, THEODORE). With the Republican party thus divided, the Democrats won an easy victory in the fall elections. Taft secured eight electoral votes, those of Utah and Vermont. Roosevelt secured eighty-eight and Woodrow Wilson, 435. The popular vote was 3,483,922 for Taft, 4,126,020 for Roosevelt, and 6,286,214 for Wilson.

As Ex-President. Taft accepted his defeat in a dignified manner, and when his term of office was finished he accepted the post of Kent professor of law at Yale University. From time to time he expressed himself forcibly on questions of national interest,

especially on President Wilson's foreign policies. He was very critical of the administration plan to give the Philippine Islands their independence. Taft became chairman of the executive committee of the Red Cross in 1916, and was also made president of the League to Enforce Peace. When the country entered the World War no other public man worked more sincerely to help carry the struggle to a victorious conclusion, and in order to give his full energies to the cause he temporarily abandoned his university lectures. Meanwhile he became fully reconciled to his old friend Theodore Roosevelt; old animosities were forgotten in the nation's crisis. During the period following the armistice Taft spoke and wrote energetically in favor of President Wilson's plan for a League of Nations. On June 30, 1921, President Harding appointed him Chief Justice of the Supreme Court.

Related Articles. Consult the following titles for additional information:

Conservation
Nations, League of
Philippine Islands
Pinchot, Gifford

Political Parties in
the United States
Tariff
Trusts

TAGORE, *tagohr'*, SIR RABINDRANATH (1860-), an Indian (Bengalese) poet, philosopher and religious teacher, winner of the Nobel Prize for literature in 1913. For many years before he became an international figure he was known as the prophet of Bengal. His poems, dramas, short stories—in fact, all his writings—are filled with deep religious faith. He is inspired by things spiritual and idealistic, and his sympathetic understanding of the beauties of nature is marvelous. Tagore is primarily an interpreter of the East, and although he traveled extensively, his works rarely reveal the influence of Western civilization.

Tagore was born in Calcutta of a distinguished family. At the age of seventeen he went to Europe to complete his education. Returning to India, he became famous as an educator and philosopher, and he founded a university in Bengal. He has translated many of his own works into the English language. Although these are inferior to the originals, they interpret their spirit, and many excel in their technique. Among the most widely known of these translations are *Gitanjali*, *The Crescent Moon*, *the Gardener*, *Short Stories*, *The Post Office*, *The Realization of Life*, *The Wreck and Thought Relics*.

Tagore has spent some time in America, and in 1916 he made a lecture tour through the country, his subject being "Internationalism." His patriotism won for him the title of "the Soul of Bengal," and his writings have had a powerful influence in developing a national consciousness among his people. He was knighted by King George in 1915.

TAHITI, *tah'he te*. See SOCIETY ISLANDS.

TAHOE, *ta'ho*, or *tah'ho*, LAKE, the largest lake in the Sierra Nevada range, on the boundary between California and Nevada. It is a beautiful glacial lake, twenty-two miles long and about ten miles broad, with the mountains of the two states reflected in its remarkably clear waters. Tahoe lies at an elevation above sea level of 6,225 feet and discharges through the Truckee River into Pyramid Lake, and it has been planned to draw its water through tunnels for irrigation purposes. Lake Tahoe is a noted summer resort, and its vicinity is dotted with attractive homes and fine hotels.

TAIL'OR BIRD, a song bird native to India, Malaysia and the Philippines, so named from its curious habit of sewing leaves to-



TAILOR BIRD

gether to form a nest. It encloses its nest within a large leaf, the ends of which it sews together with threads picked up with its slender bill. The nest itself is made of cotton and other soft materials. The tailor bird has a back of olive green and white under parts, and the crown of its head is chestnut. It belongs to the family of true warblers.

TAINÉ, *tayn*. HIPPOLYTE ADOLPHE (1828-1893), a French historian and critic, born at Vouziers. In his early youth he developed

scholarly habits and adopted a rigid program for study which enabled him quickly to distinguish himself. At the age of twenty-three he became professor of philosophy in the University of Toulon, but resigned the position to give his time to study and literary production. His *History of English Literature*, one of the best and most philosophical works on the subject, appeared in 1864. In the same year he was appointed a professor in the school of Fine Arts, Paris, where he won renown with a series of lectures on art. He produced many critical studies on history, literature and art, among them *The Origin of Contemporary France*, a monumental work, the result of wide research. In 1878 Taine was elected a member of the French Academy. His works continue to hold a high place by reason of their logical and accurate analyses.

TAJ MAHAL, *tahj ma hah'*, the greatest masterpiece of Indian architecture, and the most magnificent edifice of the seventeenth century. It was built outside of the city of Agra by Emperor Shah Jehan, about 1650, as a burial place for his favorite wife, Mumtaz-i-Mahal, "the pride of the Palace." The name "Taj Mahal" is the Persian for *Crown of Mahal*.

This famous mausoleum is of white marble, 185 feet square, situated in the center of a court 315 feet square. The four corners of this court are adorned with four elegant minarets, and over the whole is an exquisite white marble dome fifty-eight feet in diameter and eighty feet high, rising over four corner chapels, each crowned with a dome. The decorations consist of arabesque, mosaics and passages from the Koran in inlay work of precious stones of unsurpassed beauty. Because of the translucent alabaster dome and the windows equipped with perforated alabaster screens, no artificial lighting is required for the interior, as the light filters through these with a marvelously mellowed effect. A beautiful walled-in garden surrounds the structure, the cost of which is estimated at over \$10,000,000. See ASIA, full-page plate, *Some Types of Civilization in Asia*.

TALC, *talk* (short sound of *a*), a soft magnesian mineral, consisting of broad, flat, smooth layers or plates, soapy to the touch, of a shining luster; it is translucent and often transparent, when in very thin plates. There are three principal varieties of talc, *common*, *earthy* and *indurated*.

Talc is a silicate of magnesium, with small quantities of potash, alumina, oxide of iron and water. It is used in many parts of India and China as a substitute for window glass. A variety of talc, called *French chalk*, or steatite, is used for tracing lines on wood and cloth. Talc of the higher grade, used in the manufacture of toilet powders and gas tips, is largely imported from Italy and France.

The United States produces more talc than all the rest of the world, the output of marketed talc averaging 170,000 tons a year. Talc is found chiefly in the Blue Mountain region of the Atlantic states and in the hills of New England; it is generally mined in small fragments by underground methods. New York state leads the states by producing over one-half of the total output.

TALENT, a unit of weight and money used by the Greeks, Hebrews and other ancient peoples. As a unit of both weight and value it varied widely among the Greek states, but two standards predominated. In one of these the talent weighed 37.8 kilograms, and in the other about 26 kilograms. Upon the latter unit the largest coin used by the Greeks was based, its value being a little more than \$1,000. As a weight among the Greeks it was divided into 60 *minas* and 6,000 *drachms*. The Romans also had monetary units called *great talents* and *little talents*, the former being worth about \$480 and the latter about \$363. In other countries at different times the talent varied in weight from 30 to 43 kilograms.

In present-day usage the word *talent* applies to a special endowment or faculty, derived from the parable of the talents as narrated in *Matthew XXV*.

TALISMAN, *tal' iz man*, a figure cast or cut in metal or stone, and made, with certain superstitious ceremonies, at some particular moment of time, as when a certain star is at its culminating point, or when certain planets are in conjunction. The talisman thus prepared is supposed to exercise extraordinary influences over the bearer, particularly in averting disease. In a more extensive sense, the word is used, like amulet, to denote any object of nature or art, the presence of which checks the power of spirits or demons and defends the wearer from their malice. Relics, rosaries and images of saints were once used as talismans.

TALKING MACHINE. When Sarah Bernhardt was asked to present a play for

the moving pictures, she said, "Now I shall live a thousand years." Her countrymen and other lovers of her art may likewise hear her voice a thousand years hence, for she has spoken her "lines" into a talking machine. But Madame Bernhardt is not the only one whose voice has thus been preserved. Caruso, Melba, Tetrassini and many other great singers, actors and orators have spoken their voices into the "records."

First given to the world as a curiosity, the talking machine has become one of the most useful of modern inventions. It enables every home and school to hear the voices of the greatest singers and orators and the music of the greatest composers, and it preserves these records for future generations. It also has become a valuable aid in the business world, where it is replacing shorthand in correspondence.

The talking machine, or *phonograph*, as it was first called, was invented by Thomas A. Edison, though the origin of the idea is credited to another. The original machine consisted of the following essential parts: There was first a curved tube, one end of which was fitted to a mouthpiece, while the other end, which was about two inches in diameter, was closed with a disk of very thin metal. To the center of this disk was attached a steel point, or stylus, which, when sounds were projected on the disk from the mouthpiece, vibrated so as to give an exact reproduction of the vibrations received by the mouthpiece. This part of the apparatus was adjusted to a cylinder which rotated on a horizontal axis. On the surface of the cylinder a spiral groove was cut, and on the axis there was a spiral screw of the same pitch, which worked in a nut.

When the instrument was to be used, a piece of tin foil was gummed round the cylinder, and the steel point was so adjusted that it just touched the tin foil. If words were spoken through the mouth piece and the cylinder was kept rotating, a series of small indentations was made on the foil by the vibratory movement of the steel point. These markings had an individual character, due to the various sounds addressed to the mouthpiece, and when the point was made to pass over the cylinder the second time, the sounds spoken into the mouthpiece were reproduced.

Improvements. The first phonograph was a crude instrument, and its performances were not wholly pleasing, but it showed the

possibilities the instrument would possess when it was perfected. The first marked improvement of the phonograph introduced in 1885, consisted in the substitution of a wax cylinder for that covered with tin foil. The wax cylinder was the invention of Chichester A. Bell and Charles S. Tainter, and the inventors called the improved machine, the *graphophone*. Two years later the *gramophone* appeared. In this machine a disk took the place of the cylinder, and the stylus cut upon the disk a zigzag groove of uniform depth, instead of varying depths, as on the cylinder. The gramophone was invented by Emile Berliner, and all instruments of recent make are based upon his invention. The various later patents are for modifications or attachments which make the machine more nearly perfect, and so well have the inventors succeeded that the best machines return an almost perfect reproduction of the sounds they receive.

A large trumpet-shaped horn was used with the graphophone to intensify the sound. All modern instruments have a sound chamber containing a sounding board similar to that in a piano. The best instruments are in hand—some cases which are an ornament in the most elaborately furnished homes. Much attention has been given to perfecting the “needle,” or reproducing stylus, and some instruments are fitted with diamond-pointed needles that resist all wear. Machines are known by their trade names. The *Victor Talking Machine*, the *Disk Graphophone*, the *Columbia Phonograph* and the *Edison Diamond Disk* are all modifications of the Berliner’s gramophone.

TALLAHASSEE, *tal a hass’ee*, FLA., the capital of the state and the county seat of Leon County, 165 miles west of Jacksonville and twenty-five miles north of the Gulf of Mexico, on the Sea Board Air Line, and the Georgia, Florida & Alabama railroads. It is the junction point of the main line of the Dixie Highway and the old Spanish Trail, is picturesquely situated near several beautiful lakes, and has a semi-tropical climate. The place is rapidly becoming modernized, and has brick paved streets and a golf course that is one of the finest in the South. The Florida State College for Women, the Florida State Normal and Industrial College and the Florida Agricultural and Mechanical College for colored students are located here. There are two high schools, the “Sein” for white and the “Lincoln” for colored children. Important

buildings are the capitol, the Governor’s mansion, the Supreme Court Library and the Federal building.

Tallahassee is situated in an agricultural district which produces cotton, tobacco, sugar cane and dairy products. It is not important industrially, but there are cottonseed-oil, tobacco and canning factories, and ice, furniture and novelties are manufactured. The town was laid out in 1824 on a site previously selected as the seat of the territorial government. It was incorporated as a city in 1827. Population, 1910, 5,018; in 1920, 5,637.

TALLEYRAND-PERIGORD, *tah la rahN’ pa re gor’*, CHARLES MAURICE, Duke de, Prince of Benevento (1754-1838), a French statesman ranking next to Napoleon as one of the greatest historical figures of his day. He was born in Paris and was educated for the Church. In 1788 he was consecrated bishop of Autun, despite the immorality of his life. On the meeting of the States-General in 1789, he was elected deputy for Autun, where his advocacy of the union with the Third Estate ranked him at once as one of the leading reformers.

State Rights Above Church. Talleyrand was appointed a member of the commission to draft a constitution for his nation. In 1789 he assisted in framing the Declaration of Rights and proposed the confiscation of Church property as belonging to the right of the nation. In 1790 he was elected president of the National Assembly. In 1791 he was sent to London on a diplomatic mission, and during his stay there was proscribed for alleged royalist intrigues. Forced to leave England by the provisions of the Alien Act, in 1794, he sailed for the United States. In 1796 he returned to France, and in the following year was appointed Minister of Foreign Affairs. In this capacity he negotiated with the three American envoys sent by President Adams to adjust commercial difficulties between France and the United States (see X Y Z CORRESPONDENCE).

Napoleon and Talleyrand. He devoted himself entirely to Bonaparte, whom he had early recognized as the master spirit of the time, and after Bonaparte’s return from Egypt, Talleyrand contributed greatly to the events which led to the fall of the Directory and the establishment of the Consulate. He was then reappointed Minister of Foreign Affairs, and for the next few years was the executor of all Napoleon’s diplomatic

schemes. After the establishment of the Empire, in 1804, he was appointed to the office of Grand Chamberlain, and in 1806 was created Prince of Benevento.

After the Peace of Tilsit, in 1807, a coolness arose between him and Napoleon, which became more and more marked. In 1809 he resigned his office, and in 1814 helped to secure Napoleon's abdication. He took part in the Congress of Vienna, and in 1815, when the allies again entered Paris he became Minister of Foreign Affairs. After a short time he resigned this position and retired to private life. When the revolution of July, 1830, broke out, he advised Louis Philippe to accept the throne, and held several diplomatic offices under the new government. His last important public act was in the capacity of ambassador to England, when he succeeded in forming the quadruple alliance of France, Great Britain, Spain and Portugal. Before his death it is recorded that he became reconciled to the Church.

Estimate. Talleyrand stands out as a foremost type of the unscrupulous diplomat and politician. Even though a skeptic in religion and loose in morals, he guided France many times through stormy periods when conditions made the wisest course impossible to foresee.

TALLOW, a solid fat, obtained from animals, especially cattle and sheep, by subjecting the carcasses to steam heat in closed kettles. Beef tallow of the best quality comes from the fat around the kidneys; that of a cheaper grade is obtained from the caul and other tissues. Tallow is purified by heating to a high temperature and then straining. When cold, it is white and hard, resembling lard, except that it is somewhat whiter. The most extensive use of tallow is in the manufacture of soap; it is also employed in the manufacture of candles, lubricants, and in dressing leather. A specially prepared tallow is used in making oleomargarine. A substance similar to animal tallow is obtained from certain



TALLOW TREE

TALLOW TREE, the name of several trees which produce a tallowlike substance, used for making candles. One of the largest and most beautiful, and the most widely distributed of the plants is found in China, where it is called the *candle tree* and the *wax tree*. From a remote period it has furnished the Chinese with the material out of which they make candles. The capsules and seeds are crushed together and boiled; the fatty matter is skimmed as it rises, and it condenses on cooling.

The tallow tree has been introduced into the United States, and is almost naturalized along the coasts of the Carolinas and Georgia. In addition to candles, a soap emitting a balsamic odor is made from it. The leaves furnish a black dye; the stem yields a resinous substance, called *copal*, an ingredient in the making of varnishes.

TALMAGE, *tal'maje*, THOMAS DE WITT (1832-1902), a great American clergyman and pulpit orator, born at Bound Brook, N. J., and educated at New York University. After holding several charges he served as pastor of an important Presbyterian church in Brooklyn (1869-1894), which came to be known as "The Tabernacle." Talmage gained a great reputation for his eloquence, remarkable oratory, and fearless denunciation of existing evils. His influence was further spread through his lyceum work and the syndication of his sermons throughout the country; they were likewise translated into many foreign languages. His sermons were written in popular vein and characterized by fantastic figures of speech.

From 1895 to 1899, Talmage was assistant pastor of the First Presbyterian Church, Washington, D. C. He lectured widely in America and England, was editor of *The Christian at Work* (1873-1876), *The Advance* (1877-1878), *The Christian Herald* (1890-1902), and was the author of several published works, including *The Pathway of Life*, *From Manger to Throne*, and *Every-Day Religion*.

TALMUD, *THE*, the book of Jewish civil and canonical law not comprised in the Pentateuch. It consists of two parts: the *Mishna*, or the laws written in Hebrew; and the *Gemara* or commentary on the law, written in Aramaic, into which crept many anecdotes, proverbs, legends and some history, so that it might be called a cyclopedia of rabbinical knowledge.

The *Mishna*, meaning *instruction*, comprising sixty-three treatises, is composed of six main divisions: (1) on tithes, agriculture, etc.; (2) on festivals, feasts and the Sabbath; (3) on marriage, vows and oaths; (4) on penal laws and ethics; (5) on sacrifices, including a description of the Temple of Jerusalem; (6) on purifications.

The *Gemara* included the discussions on the *Mishna* by the rabbis of Babylon and Palestine, from the third to the sixth century, when the two were brought together in a final compilation. In the *Gemara* doubts are resolved, duties explained and the most minute circumstances relative to the conduct of life are fully discussed.

The Talmud is especially valuable to students of religion, history and language. It had its beginnings in the time of Ezra, in the period of Exile, when new conditions of national life called for new laws. Translations are found in English, French and German.

TALUS, the heap of broken rock that forms at the base of cliffs and steep mountain slopes. It varies from a few inches to many feet in thickness, depending upon the size of the cliffs and the length of time which it has been under formation. The rocks are broken off by weathering, usually by the repeated freezing and thawing of water in their crevices. Where the fragments are coarse, the inclination of the talus is very steep; where they are fine, it is more gradual. An old talus contains more fine rock than a new one, since the fragments are continually undergoing decomposition and forming soil. See **EROSION**; **SOIL**.

TAMARACK, *tam'a rak*, an American timber tree common in swamps. It grows from thirty to ninety feet in height and its resinous wood is valued for posts, ties, poles, etc. In Western and Southern United States it is called the *larch*; in New England and Canada, *hackmatack*. See **LARCH**.

TAMARIND, *tam'a rind*, a large, beautiful tree, native of the East and West Indies. Its pods are filled with a sweet, delicately-flavored pulp, which, together with the seeds it contains, is preserved in sugar, packed in layers in casks and shipped in large quantities into Europe and America, when it becomes the preserved tamarind of commerce. The seeds are used to make yellow and red dyes. The wood, especially in the roots, is beautiful, but it is so hard that it is difficult to work. It is valuable for cabinet work.

The tamarind is widely distributed in warm countries, and in the United States has been successfully cultivated only in Florida.

TAMBERLANE. See **TIMUR**.

TAMBOURINE, *tam boor een'*, a musical instrument of the drum type, consisting of a piece of parchment stretched over the top of a broad hoop, which is furnished with little bells. It has no musical pitch and is used merely to beat rhythm. It is sounded by sliding the fingers along the parchment, or by striking it with the knuckles or with the fist or the elbow. It is a favorite instrument among the peasants of Spain and Italy, and was long used in Egypt. It is similar to the *timbrel* of the Old Testament. The tambourine is largely used in Salvation Army bands and in some of the modern dance music.

TAMMANY, *tam'a ni*, **SOCIETY**, a powerful political organization in New York City. The name was adapted from that of an Indian chief, Tamanend, of the Delaware tribe, who, according to tradition, was wise and virtuous and friendly toward the white man. The society was founded in New York City, May 12, 1789, for the purpose of promoting the cause of independence. The original members were those who, prior to the Revolutionary War, had been members of such patriotic organizations as the Sons of Liberty; and in its beginnings the society was purely patriotic and fraternal in aim. The worthy causes it aided were many. In



TAMARIND

promoting friendly relations with the Indians, in advancing the cause of education and in undertaking enterprises of an even more dis-

tinctively patriotic character it demonstrated its usefulness. Gradually there grew up within the society a strong political element, which identified itself with the Democratic-Republicans, as opposed to the Federalists. In time this wing of the society dominated the whole body, converting it into a powerful political machine.

The society first took an active part in a political campaign in 1800, when it carried New York for Jefferson. From that time to the present it has been recognized as the local representative of the national Democratic party. It has exercised a powerful influence on state politics and a preponderating influence on the politics of the city. From 1834 to 1913, it elected two-thirds of the mayors. The strength of the society lies in its hordes of adherents, largely of the foreign element, living on the East Side of New York City and in other congested districts, whose loyalty it gains by manifesting a sort of paternal interest in their material welfare.

Such an organization as Tammany places great power in the hands of a few of its leaders. The result has been numerous cases of fraud and corruption. In 1871 William M. Tweed, head of the "ring," was found guilty of having carried on a gigantic scheme of bribery whereby he had robbed the city of millions of dollars, and he was imprisoned. Twenty-five years later another notorious leader was Richard T. Croker, who was succeeded by Charles F. Murphy. For about twenty years Tammany has controlled fully half of the time the government of the City of New York.

TAMPA, FLA., the second city in size in the state and the county seat of Hillsboro County, 212 miles southwest of Jacksonville, on Tampa Bay, at the mouth of the Hillsboro River, and on the Atlantic Coast Line, the Sea Board Air Line, the Tampa & Gulf Coast and the Tampa Northern railroads. The city has an attractive location and a healthful climate, and has become a popular winter resort. Special features of interest are the De Soto Park, where the United States volunteers camped during the Spanish-American War; the Athletic Grounds; the Tampa Bay Hotel, municipally owned; the old government reservation, and the Convent of Holy Names. Large quantities of phosphate, fruits, vegetables, turpentine, rosin, lumber, fish and cattle are exported from Tampa, while the port is second only to New York in the importation

of tobacco. Cigar making is the principal industry, 300,000,000 Havana cigars being turned out annually. Fertilizer is also manufactured. Fishing is an important industry. Tampa was occupied as a military post during the wars with the Seminoles (1835-1842). It was incorporated and made a port of entry in 1886. About the same time the tobacco business began to be developed, and the city has since grown steadily. Population, 1910, 37,782; in 1920, 51,252.

TAMPICO, *tahm pe'ko*, MEXICO, the country's most important center of distribution of oil production and one of its leading seaports. It is situated on the Gulf of Mexico, at the mouth of the Tampico River, 206 miles north-east of Mexico City.

Tampico has a good harbor, which is protected by a breakwater and a jetty. The town is well laid out; it has broad streets and a number of public monuments, and it contains naval and military hospitals. Most of the buildings are of the Spanish type of architecture. It is an important commercial port and carries on a good trade with Great Britain and the United States. Despite its hot, unhealthful climate, the city has enjoyed a remarkable boom because of the development of the rich oil fields in its vicinity. In 1914 Tampico was the scene of an insult to the American flag which almost led to war between the two countries. During the World War the oil wells of Tampico provided almost all of the oil used by the British navy. Estimated population, 35,000.

TANAGER, *tan'a jur*, a family of birds, closely related to the finches, noted for the brilliance of the male plumage. Of the 350 known species, dwelling chiefly in the tropical regions of Central and South America, its representatives in America are of five species, only two of which, however, reach into Canada.

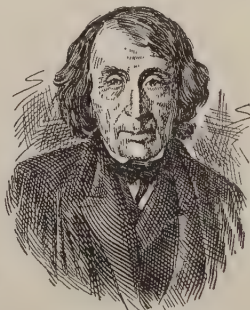
The *scarlet tanager*, except for its black wings and tail, is covered with brilliant scarlet plumage, which makes him the brightest of all the birds of the northern United States. Its nest is a rather loose structure, placed in trees, and its eggs are pale blue, spotted with brown. The *summer tanager* is rose-red all over, brighter in tint below, though the female is rather dull in color, being a yellowish-green. It is native to the Southern states and has the same nesting habits and song as the scarlet tanager. The *Louisiana*, or *Western*, *tanager* is found in the summer from the

Rockies to the Pacific coast. The male of this species is bright yellow, with black back, tail and wings and crimson head.

TANANARIVO. See **ANTANANARIVO**.

TAN'CRED, *tang'kred* (about 1050-1112), one of the most famous heroes of the First Crusade. He was a Prince of Antioch and distinguished himself at the siege of Nicaea, at the Battle of Dorylaeum, at the capture of Jerusalem, and at Ascalon. He was made Prince of Galilee by Godfrey de Bouillon. Tancred is represented by Tasso, in the *Jerusalem Delivered*, as the flower and pattern of chivalry.

TANEY, *taw'ny*, **ROGER BROOKE** (1777-1864), a famous Chief Justice of the United States Supreme Court, who gave the decision in the Dred Scott Case (see **DRED SCOTT DECISION**). He was born in Calvert County, Md., and educated at Dickinson College. He was admitted to the bar in 1799; and was elected to the state senate in 1816 as a Federalist, but he later joined the Democratic party and supported Andrew Jackson. The latter, in 1831, appointed him Attorney-General of the United States, and in 1833 Secretary of the Treasury. In 1836 Taney succeeded John Marshall as Chief Justice of the Supreme Court.



ROGER BROOKE
TANEY

As a jurist he displayed marked ability and great learning as a lawyer, though he reversed the previous tendency of the court toward centralized government and stood firmly for state sovereignty. Many of his decisions were severely criticised, especially that in the Dred Scott Case, and the one denying the right of the President to suspend the writ of *habeas corpus*.

TANGANYIKA, *tahn gan ye'ka*, one of the largest and deepest fresh-water lakes in the world, its area being estimated at over 12,000 square miles. It is situated east of the central part of Africa, lying on the borders of the Congo Free State and what was formerly German East Africa, and its greatest extent is from northwest to southeast. Its length is about 400 miles, and its width varies from twenty to forty miles.

Tanganyika occupies a narrow basin, enclosed by an almost continuous series of hills and mountains. It is fed by a number of rivers and discharges its waters by the Lukuga, on the west, into the Lualaba, or Upper Congo. The surface is noted for its changes of level caused largely by periods of rainfall and dry weather. The lake has but few shoals or reefs, but there are numerous floating islands of vegetation, densely forested with palms. Severe hurricanes and tornadoes make navigation perilous; its waters abound in fish, crocodiles and hippopotami.

The lake was discovered by Burton and Speke in 1858, and later was explored by Livingstone, Stanley and other travelers. The lake is navigated by steamers and is connected with Lake Nyassa by a carriage road 210 miles long. In 1914 Belgium began construction of a railroad from the Upper Congo to Lake Tanganyika (See **CAPE TO CAIRO RAILWAY**).

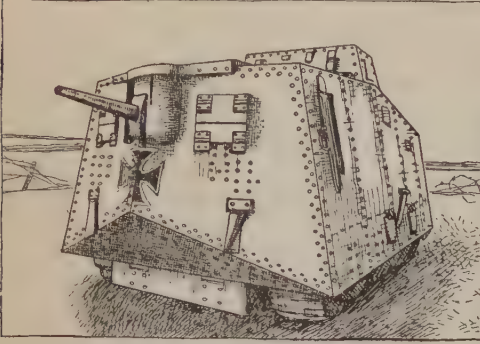
TANGANYIKA TERRITORY. See **GERMAN EAST AFRICA**.

TANGERINE, *tan'jer een*, a variety of orange, so named from Tangier, Morocco, where the first specimens were found. It is flatter and deeper in color than the orange. The peel is easily removed from the pulp, which is sweet, juicy, and highly prized because of its flavor. The tangerines are said to have been produced in the United States from the mandarin orange; they are cultivated in most of the states bordering on the Gulf of Mexico.

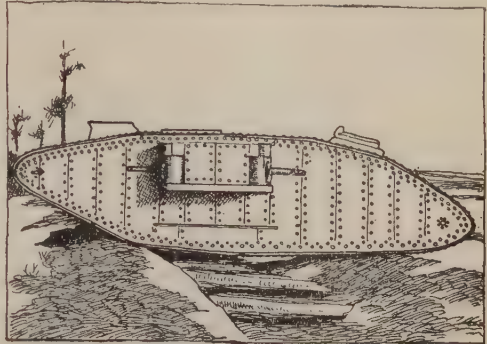
TANGIER, *tan jeer'*, or **TANGIERS**, a seaport and the diplomatic capital of Morocco, situated near the western entrance of the Strait of Gibraltar, thirty-six miles southwest of the town of Gibraltar. Its site is at the head of a spacious bay, and when seen from the sea, the town presents a striking appearance, rising in the form of an amphitheater. The houses are nearly all of one story and are built along lanes or narrow streets, many of which are too steep to admit of the use of carriages. There are a few modern residences, occupied by Europeans and by the most wealthy merchants. The city also contains a number of mosques, a Roman Catholic church and several Jewish synagogues. It is lighted by electricity. The harbor is fairly good, and the trade is considerable, though in the last half century it has materially fallen off. The city is the center of a caravan trade of some importance, and most of

its exports go to the cities of southern Europe. In 1662 it became a possession of Great Britain, but was abandoned after

vention. These tanks were first used in the Battle of the Somme, September 15, 1916, where they proved their value in preparing



GERMAN TANK



ENGLISH TANK

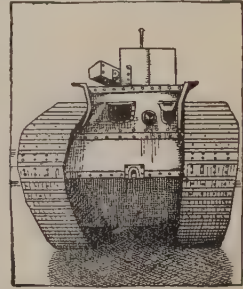
twenty-two years. Population, estimated, 46,000.

TANK, ARMORED, an armored automobile constructed on the plan of the caterpillar tractor. The largest tanks are about thirty feet long and about the width of an automobile truck, and they weigh from thirty to forty tons. Their distinctive feature is the endless track which is propelled by the motor wheels in the interior. Their form and construction are readily understood from a study of the accompanying illustrations. The armament of the small tanks consists of machine guns, but the large ones carry in addition one or two small field guns. The entire structure is enclosed in bullet-proof armor.

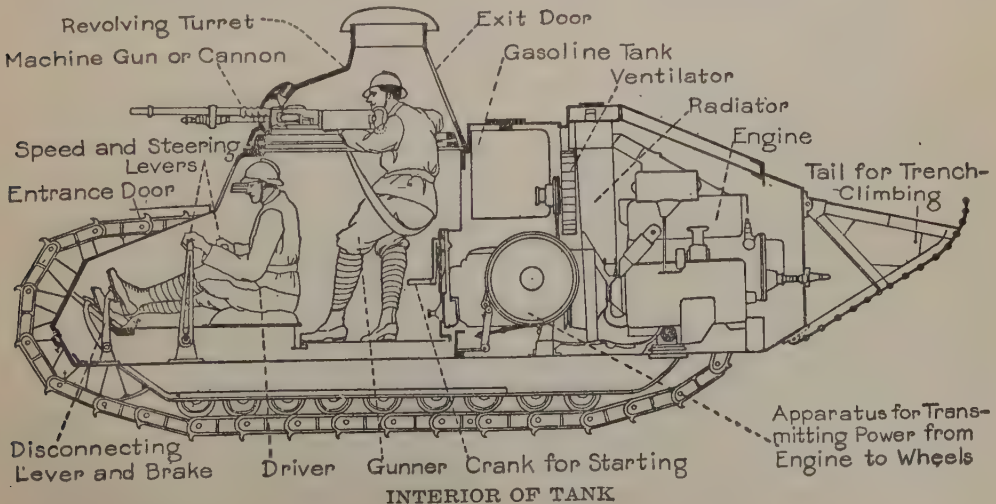
The armored tank was devised in the British War Department and is based upon the caterpillar tractor, which is an American in-

the way for the infantry. Their speed is relatively slow—from three to ten miles per

hour—but their progress is practically irresistible. They can break down barbed wire entanglements, crush machine gun emplacements, and climb into and out of trenches like huge mud turtles. The slow but ceaseless progress of these ungainly monsters at the Battle of the Somme struck terror to the hearts of the Germans, most of whom fled or surrendered without offering resistance.



FRONT VIEW OF THIRTY-TON MODEL



Following the Battle of the Somme, the allied armies added tanks to their equipment as fast as they could be manufactured, and they were of the greatest assistance in forcing back the lines of the enemy in the fierce fighting before the signing of the armistice, in November, 1918. See **WORLD WAR**.

TANNHAUSER, *tahn'hoi zur*, in old German legend, a knight who gained admission into a hill called the Venusberg, a region in the Thuringian Forest, in the interior of which Venus held her court. For a long time Tannhauser remained buried in sensual pleasures, but at length heeded the voice of the Virgin Mary, who called upon him to return. The goddess allowed him to depart, and he started upon his pilgrimage to Rome to seek the Pope's absolution. The Pope, however, when he learned the extent of the knight's guilt, declared that it was as impossible for him to obtain pardon as it was for the wand in the Pope's hand to bud and bring forth green leaves.

Despairing, Tannhauser retired from the presence of the pontiff and entered the Venusberg once more. Meanwhile the Pope's wand actually began to sprout, and the Pope, taking this as a sign from God that there was still opportunity of the knight's salvation, hastily sent messengers into all lands in quest of him, but Tannhauser was never again seen.

Richard Wagner adopted this legend, with modifications, as the subject of one of his operas. *Tannhauser* was first produced in Dresden in 1845, and it since has had conspicuous place in the repertoire of all European and American opera companies. Of its many exquisite melodies, the *Pilgrims' Chorus* and *Address to the Evening Star* are the most familiar. Swinburne's poem, *Laus Veneris*, is based on the legend, and it has been treated by Heine, Tieck and other poets.

TANNIN, *tan'in*, or **TANNIC**, *tan'ik*, **ACID**, a substance prepared by extraction from powdered gallnuts, by means of a mixture of alcohol, ether and water, from which it is obtained by evaporation. It is almost colorless and odorless, has a bitter taste and is used as an astringent in medicine, as a mordant in dyeing and, in combination with other substances, as coloring matter in ink. Similar substances are prepared from other vegetable growths and are sometimes called *tannic acid*; such as *alder tannin*, *caffetannic acid* (prepared from coffee berries) and *fraxitannic acid*, from leaves of the ash tree.

TANNING. See **LEATHER**.

TAN'SY, a well-known plant of the Composite family, abundant in Great Britain and throughout Europe, and naturalized in many parts of the United States. It is a tall plant, with divided leaves and button-like heads of yellow flowers. Every part of the plant is bitter. Tansy tea is an old popular medicine, believed to be a fine tonic. Tansy is now cultivated in gardens, and grows along roadsides. The young leaves were formerly used for flavoring cakes, puddings, etc.

TANTALUS, in Greek mythology, a son of Jupiter, and king of Phrygia, Lydia, Argos or Corinth, who was admitted to the table of the gods, but forfeited their favor, either by betraying their secrets, stealing ambrosia from heaven, or presenting to them his murdered son Pelops as food. As punishment he was plunged into a deep pool with water up to his chin, but, plagued by an unquenchable thirst, the waters receded from his lips when he attempted to drink. Crazed by the never-ceasing pangs of hunger, he was tempted by delicious fruit which hung above him, and which withdrew when he tried to partake of it. According to other accounts, a huge rock forever threatened to fall and crush him. The word *tantalize* is derived from this legend.

TAOISM, *tau'iz'm*, a system of philosophy originated in China in the sixth century. Lao-tse is commonly regarded as the founder of the faith, although it is probable that the religion had existed before his time and that he gave it more definite form. The Chinese of to-day rank Lao-tse with Confucius. The principles underlying his philosophy are difficult to explain, but he strove to bring out the best in human action and endeavored through right conduct to point the way to true happiness.

After the entrance into China of Buddhism, Taoism adopted many of the peculiarities of the new faith. It degenerated into superstition and mysticism; to-day the ritual is a combination of witchcraft and demonology, void of the slightest tinge of resemblance to the teachings of Lao-tse. See **CHINA**, subhead *Government and Religion*.

TAPAJOS, *tah pah zhosh'*, one of the principal tributaries of the Amazon River, rising in the middle west of the south-central part of Brazil and flowing northward into the Amazon. Its length is about 1,200 miles, and it is navigable for small boats to with-

in a few miles of its source; the last 200 miles are navigable only for large vessels.

TAPESTRY, an ornamental fabric used for wall decoration in churches and palaces and as covering for windows and furniture. Tapestry is made by a special process of weaving, whereby colored woof threads are interwoven with undyed warp threads after the warp threads have been stretched on the loom. The varied colors of the woof threads produce the pattern. The work is done with an instrument that is a combination of shuttle and bobbin; needles are never used in tapestry weaving. The so-called Bayeux Tapestry, in the Bayeux Library, Normandy, is really a piece of embroidery. It probably was given its name because, like many tapestries, it pictures elaborate historical scenes (see **BAYEUX TAPESTRY**).

Flemish and French Tapestries. Tapestry weaving dates from antiquity. As mentioned by Homer, Penelope and Andromache each wove picture tapestries, while Helen of Troy wove on tapestry the story of her own tragic life. However, the art reached its supremacy in the fifteenth century, when the industry was centered in Arras, Flanders. So excellent and distinctive were the tapestries there made that to identify them they were given the name of the city of their manufacture. Antwerp, Brussels, Bruges, Lille and Valenciennes became such important centers that the art of tapestry making became nationalized in France and in Flanders.

Gobelin Tapestry. In the seventeenth century, a factory under royal patronage was established in Paris in the dye works of the Gobelin family, which, in 1662, was organized as a state institution. Gobelin tapestries became renowned the world over, and the present museum in connection with the establishment and one in Florence are the only two museums in the world housing nothing but exhibits of tapestries and textiles. In addition to reproductions of many masterpieces of painting, famous Gobelins reproduce historical scenes of French history, notably events during the reigns of Louis XIV and XV.

English Tapestries. A notable English industry was established in 1619, at Mortlake, near London, continuing in existence until 1703 and following closely the French example. William Morris founded a tapestry works at Merton, near London, in 1881, which is still in operation. The most famous ex-

amples produced here are from the designs of Burne-Jones, with foliage, flowers and borders originated by Morris.

American Tapestries. The first tapestry works in the United States was established on Fifth Avenue in New York City in 1893, and later was removed to Williamsbridge. Its most significant designs follow the style of French eighteenth-century examples. Three other tapestry plants have been established in New York City since the time of the initial experiment.

Famous Collections. The world's most famous tapestries are the "Acts of the Apostles" series at the Vatican, designed by Raphael for Pope Leo X for the Sistine Chapel (see **SISTINE CHAPEL**). These wonderful examples revolutionized the art, substituted Italian for Flemish; even Flemish painters succumbed to the Italian style. Raphael's tapestries were copied by weavers, engravers and painters. The woven examples are now the prized possessions of the Royal Spanish, the Austrian and the French National collections, and of the Berlin and Dresden museums. The South Kensington Museum of England contains a collection of famous hunting tapestries. The most important early fifteenth-century tapestry in the United States is the Burgundian Sacraments in the Metropolitan Museum of art.

TAPEWORM, *tapp'worm*, an animal parasite found in a mature state in the alimentary canal of warm-blooded vertebrates. Tapeworms are composed of a number of flattened joints, or segments, attached to a head, which is furnished with a circle of hooks, or suckers, enabling it to maintain its hold on the mucous membrane of the intestines. The other segments are simply buds, given off by the head, the oldest being farthest removed from it; each is capable of reproducing a perfect worm. The tapeworm has neither mouth nor digestive organs, and absorbs its nutrition through the skin. The length of the animal varies from a few inches to several yards. A person afflicted with tapeworm has a ravenous appetite; he loses weight, has abdominal pains, and is generally restless and weak. Eating of ill-cooked pork or beef is responsible for the entrance of the parasite into the system. A person showing the symptoms described above should consult a reliable physician. No cure is effected until the head of the worm is destroyed.

TAPIOCA, *tap i o' ka*, a starch food prepared from the roots of the cassava, a plant found in the tropics. Tapioca is used chiefly in the preparation of a nutritious pudding; it is also used in thickening soups, as when boiled it swells and forms a jellylike mass. In preparing the substance for the market the roots are washed and ground to a pulp, and the mass is strained until the fibers are eliminated. The tapioca is then dried on hot iron plates, which causes the starch grains to form into small lumps.

TAPIR, *ta' pur*, a group of forest animals related to the hog. Of the five species, four are native to the western hemisphere. The common *South*

American tapir is about the size of a small ass and has a brown skin, covered with short hair. It inhabits forests and lives much in the water. It conceals



TAPIR

itself during the day and feeds on vegetables which it gathers with its flexible proboscis. Tapirs are hunted for their flesh and hides.

TAR, a thick, black, sticky product, obtained by the destructive distillation of such substances as wood, coal, peat and shale. (For the production of coal tar, see the article COAL TAR). Wood tar is made from pine, fir and larch trees. The crude stacking method is still extant in the Carolinas, Georgia and Alabama. Sticks of green pine are piled up in conical shape, and damp earth and sand are heaped over the wood to a depth of several inches. When everything is in readiness, the pile is ignited and allowed to burn slowly for about ten days. As the tar is melted out of the wood it is run into retorts, where it is distilled; wood spirit and pitch oils are given off. The black residuum is poured, while hot, into barrels, where it soon hardens and becomes the ordinary tar of commerce. As much as 150 barrels of tar are taken from a single "hole." The product is used for preserving timber, for calking seams in ships, in the making of roofs, and for other industrial purposes. It is also used in medicines and in ointments and skin lotions.

TARANTULA, *ta ran' tu la*, a large spider, named for Taranto, a city of Southern Italy, where it was first discovered and is still

found in great numbers. The name is now commonly applied to any large, hairy species in Southwestern United States and Central



TARANTULA

America. The tarantula captures its prey, not in a web, but by swiftly attacking it. It hides during the day in long, silken tubes in underground wells. The bite is very painful, but is no more dangerous than the sting of a wasp.

TARBELL, *tahr' bel*, IDA MINERVA (1857-), an American author who specializes in sociological and historical subjects, was born in Erie County, Pa. Shortly after her graduation from Allegheny College, she became associate editor of *The Chautauquan*, and later became identified with *McClure's* and the *American* magazines. Her works include a *Life of Abraham Lincoln* and several other biographies, but she is best known as the author of a *History of the Standard Oil Company*. Her keen observations on women are embodied in *The Business of Being a Woman* and *The Ways of Women*. Her only novel, *The Rising of the Tide*, has as its background the World War.

TARE, the common name of different species of the pea family, known also by the name of *vetch*. There are numerous species and varieties of tares, but that which is found best adapted for agricultural purposes is the common tare, which flourishes in poor soils, and of which there are two principal varieties, the *summer tare* and the *winter tare*. They are extensively cultivated throughout Europe for hay and as a fertilizer; one species is found in the United States. The tare mentioned in the Scriptures (*Matt. XIII, 36*) is supposed to be the darnel.

TARGET, *tahr' get*. 1, A shield, or buckler, of a small kind, such as those formerly in

use among the Highlanders, which were circular in form, cut out of ox hide, mounted on strong wood, and often covered externally with ornamental work. 2, The mark set up to be aimed at, in archery, musketry or artillery practice. These targets are generally square or oblong metal plates, on which is marked a central circle, with two or more wide rings around it. The marksman aims to put his shots as near the central point, or *bull's eye*, as possible; if he hits the bull's eye he is credited with five points; if he hits within the first circle, three points; within the second, one point. See ARCHERY.

TARGUM, *tahr'gum*, a term applied to a translation of parts of the Old Testament into the Chaldee, or Aramaic, language, originating probably when the Jews began to use Aramaic instead of Hebrew. Only three are extant on the Pentateuch, one on the Prophets; there are targums on *Psalms*, *Job*, *Song of Songs*, *Ruth*, *Lamentations*, *Esther* and *Ecclesiastes*. They are valued as studies of the lives of the peoples of those remote days.

TARIFF, in the common meaning of the term, *tariff* is the customs duties assessed on imported or exported goods, but in its broadest application it means any rate or charge. An example of the latter meaning is the tariff on railroads, which refers to the freight and passenger rates charged. The practice of levying customs duties on imports and exports was common to the nations of antiquity. Egypt, Assyria, Babylonia, all had systems of tariff. Later the same custom was practiced by the Greeks and Romans, by whom it was handed on to the nations of the Middle Ages, and nearly all nations of modern times have resorted to the tariff system.

Purposes of a Tariff. A tariff is levied for one or more of the following purposes:

1. To obtain revenue for the government.
2. To protect home industries.
3. To retaliate for unjust commercial treatment by some other nation. When resorted to for this purpose, tariff becomes commercial warfare.

A nation levying tariff for revenue only is called a *free trade* nation. England, for example, had been a free trade nation for more than half a century before the World War. A tariff designed to protect home industries is called a *protective tariff*. It affords protection to the industry upon whose products it is laid, by placing a tariff in

addition to that for revenue equal to the difference in the cost of manufacture of the article in a foreign country and the manufacture of the same article in the country where it is protected. If steel rails, for instance, can be manufactured in England and shipped to the United States at a price that will allow them to be sold for \$200 per ton, and it costs \$210 per ton to make them in the latter country, the American manufacturers of rails will be unable to compete with British manufacturers. To protect the American manufacturers, Congress may place a special tariff of \$10 a ton on the imported rails, which cannot then be sold for less than the domestic product.

A tariff for retaliation is seldom resorted to at the present time, but many commercial treaties contain *reciprocity* agreements, whereby each nation agrees to admit certain articles into its ports at a lower tariff than the regular schedule requires, provided, the other nation will admit certain articles into its ports on a similar basis. Fair reciprocity agreements are usually advantageous to both countries. In general, a revenue tariff is best for nations that have to import most of their raw material, and a large proportion of their foodstuffs. It was because of these conditions that England became a free trade nation. On the other hand, protection is usually considered the best policy for a new nation having abundant resources and desirous of building up extensive manufacturing interests. This policy also applies to older nations, having an abundance of raw material and extensive manufacturing interests. Before the World War all the leading European nations except Great Britain had protective tariffs.

In the United States. Prior to the adoption of the Constitution some of the individual states assessed a tax on imports, but there was no national tariff policy. Ever since the formation of the Federal government the United States has adhered generally to the policy of protection. The first tariff bill passed Congress in 1789, and from that time to the present the tariff has been one of the chief sources of political controversy. This bill had for its purposes the provision of revenue to support the government, paying the debts of the United States and for the "encouragement and protection of manufactures." The act was frequently amended, the duties always being raised, until 1824,

when a bill was passed providing an average rate of 37 per cent. Meanwhile the loose constructionists, under Clay, had declared for a protective tariff, in opposition to the strict constructionists, the forerunners of the modern Democrats, who claimed that the Constitution gave no power to levy anything but a revenue tariff.

The Tariff of Abominations. The result of the controversy between the strict and loose constructionists was the tariff of 1828, known as the "tariff of abominations," because it represented a decided advance towards protective duties. It was protested against by the Southern states, on the ground that it would lead foreign nations to discriminate against American raw materials, upon the export of which the South depended; also, because they believed it to be unconstitutional. In 1832 the South Carolina legislature declared the acts of 1824 and 1828 null and void, and prohibited the collection of duties.

Compromise of 1833. In the following year Henry Clay introduced a compromise tariff bill. The object of this bill, as expressed in its preamble, was "to prevent the destruction of the political system, to arrest civil war and to restore peace and tranquillity to the nation." It provided for a gradual reduction in duties. In response to firm action by Congress and by President Jackson, the nullification acts were repealed by South Carolina. From 1840 to 1845 several tariff bills were drafted and discussed, but only one, which provided for a rate of about 33 per cent, was passed. In 1846 the Walker tariff bill was passed, reducing the rate of duty to 25½ per cent. The tariff was further reduced until at the outbreak of the Civil War duties averaged about 20 per cent.

Civil War Period. With the outbreak of the Civil War, the policy of decreasing duties was abandoned. The Morrill tariff of 1861 raised the tariff to 27 per cent. During the next two years the tariff was raised several times on special articles; in 1864 all duties were raised by 50 per cent, and another increase was ordered in 1866.

Since the Civil War. A gradually growing discontent with the maintenance of the Morrill tariff, or so-called "war tariff," led, in 1882, to the appointment of a tariff commission to ascertain the effect of, and to recommend changes in, the existing tariff laws, but the resulting bill (1883) was satisfactory

to nobody. The Democrats came to power in 1884 and introduced, in 1888, the Mills bill, a measure intended to reduce taxation and simplify the collection of revenue, but it failed to become a law. The Republicans returned to power in 1888, and two years later they passed the McKinley bill, which generally raised the duties.

In 1894 the Democrats were in control and passed the Wilson-Gorman Tariff Act, which materially reduced the tariff, and became a law without the President's signature. This act was superseded by the Dingley Act in 1897, which again inaugurated a high tariff. In 1909 the Payne-Aldrich Act was passed at a special session of Congress. This act purported to lower the tariff, but it was not satisfactory to a great majority of the people, and resulted in the returning of a Democratic majority to the House of Representatives in the Sixty-second Congress. The bill provided for the appointment of an advisory tariff commission. In 1913 President Wilson called a special session of Congress to revise the tariff. The bill passed by this Congress, known as the Underwood-Simmons Tariff Act, provided for many changes in the rates. The duties on cotton goods and on woolen goods were greatly lowered and wool was placed on the free list. Sugar was to pay a slight duty until May 1, 1916; after that date it was to be free. Also on the free list were many chemicals and other articles. The Sixty-sixth Congress, which was under control of the Republicans, planned to place a protective duty on dyestuffs and numerous other articles whose manufacture had been developed after the outbreak of the World War, because these articles could not be obtained in Europe.

Related Articles. Consult the following titles for additional information:
 Customs Duties Protection
 Economics Nullification
 Free Trade Reciprocity
 Political Parties Tax

TARKINGTON, *tahr'king tun*, NEWTON BOOTH (1869–), a present-day American novelist, born in Indiana and educated at Princeton University. *The Gentleman from Indiana*, his first book, won immediate recognition, and each succeeding novel added fresh laurels. Some of his stories have been successfully dramatized, notably *Seventeen*, *Penrod* and *Monsieur Beaucaire*. A late novel, *The Magnificent Ambersons*, records the changes in American life that are taking place in the present generation. Tarkington's

The Man from Home, a comedy, was a stage success. In 1919 *Monsieur Beaucaire* was produced as an opera. In 1920 and 1921 he issued *Ramsey Milholland* and *Alice Adams*.

TARPEIAN, *tahr pé'yan*, **ROCK**, a precipitous rock, forming part of the Capitoline Hill at Rome, over which persons convicted of treason were hurled. It was so named, according to tradition, from *Tarpeia*, a vestal virgin of Rome, the daughter of the governor of the citadel on the Capitoline, who, covetous of the golden bracelets worn by the Sabine soldiery, opened the gate to them, on the promise of receiving what they wore on their left arms. Once inside the gate they threw their shields upon her, and crushed her to death. She was buried at the base of the Tarpeian Rock.

TARPON, *tahr'pon*, a large game fish of giant strength, found on the southern coast of the United States and in the West Indies. The tarpon is shaped something like the salmon. It attains a length of five or six feet and a weight of from 100 to 400 pounds. Tarpon fishing is a favorite sport, for this fish is a skilful fighter. Its flesh is too coarse for food; but its large, tough, silvery scales are used in ornamental work.

TARQUINIUS, *tahr kwin'ius*, **LUCIUS**, surnamed *Priscus* (the elder), in Roman tradition, the fifth king of Rome. He became the favorite and confidant of the Roman king, Ancus Martius, and at the latter's death Tarquinius, although not of royal blood, was unanimously elected king. According to Livy, he made war with success on the Latins and Sabines, from whom he captured numerous towns. His reign was also distinguished by the construction of the Cloaca Maxima, the Forum and the wall about the city, and by the commencement of the Circus Maximus and the Capitoline temple. After a reign of about thirty-eight years (from 616 to 578 B. C.) he was killed by assassins employed by the sons of Ancus Martius (578 B. C.).

TARQUINIUS, **LUCIUS**, surnamed *Superbus* (the proud), the last of the legendary kings of Rome, the son of Tarquinius Priscus. He succeeded Servius Tullius, and reigned from 534 to 510 B. C. He abolished the privileges conferred on the plebeians; banished or put to death the senators whom he suspected; never filled up the vacancies in the senate, and rarely consulted that body. However, he continued the great works of his father and

advanced the power of Rome abroad by wars and alliances. After a reign of nearly twenty-five years, by his tyranny and cruelty he brought about an uprising by which he and his family were exiled from Rome (510 B. C.). He tried repeatedly, without success to regain his power, and at length he died at Cumae. In *Horatius at the Bridge* Macaulay has immortalized the attempt of Tarquinius to return to power. See **ROME**, **HISTORY OF**.

TARSHISH, *tahr'shish*, a place frequently mentioned in the Old Testament, now generally identified by Biblical critics with the Tartessus of the Greek and Roman writers. This was a district in Southern Spain, near the mouth of the Guadalquivir, settled by the Phoenicians.

TARSUS, *tahr'sus*, **ASIA MINOR**, the birthplace of the Apostle Paul and the most important town in ancient Cilicia, situated on both banks of the river Cydnus, about twelve miles from the sea. At the beginning of the Christian Era it was an important city, especially celebrated for its learning and educational institutions. Modern Tarsus is an unprogressive, unattractive city, with its only interesting features a few remains of the Roman occupation. Population, about 25,000.

TARTAN, *tahr'tan*, a cloth, checkered, or cross-barred, with threads of various colors. It was originally made of wool or silk and constituted the distinguishing badge of the Scottish Highland clans, each clan having its own peculiar pattern. An endless variety of fancy tartans is now manufactured, in wool, silk, wool and cotton, and silk and cotton. The pattern had its origin in Asia, and is probably the oldest pattern known.

TARTAR, or **ARGOL**, the hard crust adhering to the sides of casks in which wine has been incompletely fermented (see **CREAM OF TARTAR**). It varies in shade according to the color of the wine.

Tartar of the teeth, is a hard substance which occasionally is deposited from the saliva in the form of a coating upon the teeth, near the gums. It consists of animal matter, phosphate of lime and mucus from the saliva. See **TEETH**.

TARTAR, *tahr'tur*, **EMETIC**, a name given to the double tartrate of potassium and antimony, an important compound which is used largely in medicine. At first it is sweet to the taste, but the after taste in the mouth is very disagreeable. It is an active

emetic and cathartic, and it is of great value in reducing fever; but from its depressing influence on the heart, physicians are growing more careful in prescribing it.

TARTARIC ACID, a compound of carbon, hydrogen and oxygen, existing in grape juice, in tamarinds and in several other fruits. It is obtained in its commercial form principally from cream of tartar (which see).

Tartaric acid crystallizes in large rhombic prisms, transparent and colorless and very soluble in water. It is inodorous and very sour to the taste. The solution of tartaric acid acts with facility upon those metals which decompose water, as iron and zinc. Tartaric acid is largely employed as a discharge in calico printing and for making soda water powders and baking powders. It is valuable in medicine, for its cooling properties, and as an ingredient of Seidlitz powders.

TARTARS, or **TATARS**, a term loosely applied to certain roving tribes which formerly inhabited the steppes of Central Asia, but now referring to the Fishshin Tatars of Northern Manchuria, the Solons and Daurians of Northeastern Mongolia and the Manchus of China. The name has been indiscriminately applied from time to time to any Mongol invaders of Eastern Europe. *Tatar* is the more correct form. The true Tatars formed part of the horde of Genghis Khan and of the successive hordes of similar origin who followed them. See **GENGHIS KHAN**.

TARTARUS, *tahr'turus*, in early Greek mythology, a deep and sunless abyss beneath Hades, where the rebel Titans were imprisoned by Jupiter. Poets after Homer referred to Tartarus as the place in which the spirits of the wicked received their due punishment. Sometimes the name was made synonymous with Hades.

TARTARY, *tahr'tur ry*, a name applied in the Middle Ages to the wide band of country extending through Central Asia, from the seas of Japan and Okhotsk, in the east, to the Caspian Sea, on the west, including Manchuria, Mongolia, Turkestan and all the south part of Russian Asia. It was inhabited by a fierce and warlike people known as Tartars (which see). In a restricted sense Tartary is identical with Turkestan.

TASHKENT, or **TASHKEND**, **ASIATIC RUSSIA**, one of the oldest and most important towns of Central Asia and the capital of the governor-generalship of Russian Turkestan. It is situated on a tributary of the Syr-Darya,

ninety miles northwest of Khokan, and consists of the native, or Asiatic, quarters and the Russian quarters, the latter being constructed on modern plans. The city contains numerous old mosques and temples, a bazaar and several colleges. The manufactures include silk, cotton and leather goods and metal articles. The city enjoys a considerable trade, and it transships merchandise received from Bokhara, Persia, Kashmir and India. Population, 1913, 271,900.

TASMANIA, one of the six states of the Australian Commonwealth, consisting of the island of Tasmania and a few adjoining islands. Tasmania is situated 150 miles south of the eastern extremity of Australia, from which it is separated by Bass Strait.

Topography. The island measures 200 miles from north to south and 245 miles from east to west. The interior consists of a central highland, or plateau, with an average elevation of from 3,000 to 4,000 feet, bearing along its western and northwestern borders a number of mountain ridges and peaks, of which the highest, Mount Cradle, is 5,070 feet in altitude. A number of isolated summits exceeding 4,000 feet are also found in various parts of the island. The plateau contains a number of lakes, the largest, Great Lake, being twelve miles long. All are noted for the beauty of their surroundings. The climate is delightful throughout most of the year. The rainfall varies in different parts of the island, being heaviest on the west and lightest on the east and southeast.

Resources. Tasmania is rich in copper ore, silver ore, tin and gold. The wealth of the state, however, lies chiefly in its copper mines. It also has considerable coal, which is mined to a limited extent. Large areas are covered with forests of valuable timber trees, and lumbering in some localities is an important industry. The soil and climate are very favorable for agriculture, and large crops of oats, wheat and hay are cultivated. Hops is grown with success, and the raising of fruit is becoming an important industry. Large numbers of cattle, hogs and sheep, too, are raised, and the annual wool clip usually exceeds 9,000,000 pounds. The island has about 650 miles of railway in operation, two-thirds of which belongs to the state. The main line connects Hobart, the capital, with the next most important port, Launceston, while numerous branch lines reach the interior.

Government. The government is similar to that of the other Australian states. The governor is appointed by the British crown and is assisted by a council. The legislative authority rests with a Legislative Council consisting of eighteen members and a House of Assembly called the Parliament of Tasmania.

History. Tasmania was discovered in 1642 by the navigator Abel Janszoon Tasman, and was named Van Diemen's Land, in honor of Anthony van Diemen, governor of the Dutch East Indies. In 1803 it was colonized by a company of convicts from England. For about twenty years the island was under the authority of New South Wales. In 1825 it was given a separate governor and continued as a colony of the British crown until the formation of the Commonwealth of Australia, when it became a member of that federation. Population, 1921, 213,877. See AUSTRALIA; HOBART.

TASMANIAN WOLF, a flesh-eating animal having the general appearance of a wolf, inhabiting the mountainous parts of the island of Tasmania. In size it is generally about four feet in length, though some specimens attain a much greater size. It has an elongated, and somewhat doglike, muzzle, and a long, tapering tail; the fur is grayish-brown, with a series of bold transverse stripes, nearly black in color, beginning behind the shoulders and ending at the tail. Because of this marking it is sometimes called the zebra wolf. It is nocturnal in its habits, is fierce and most determined in disposition and is very destructive to sheep and other animals. The Tasmanian wolves carry their young in a pouch, as do the kangaroos.

TASSO, TORQUATO (1544-1595), an Italian poet, son of Bernardo Tasso, born at Sorrento. He was early sent to the school of the Jesuits, at Naples, and he subsequently pursued his studies under his father's superintendence at Rome, Urbino and Venice. At the age of sixteen he was sent to the University of Padua to study law, but at this time, to the surprise of his friends, he produced the *Rinaldo*, an epic poem in twelve cantos. The reception given this poem induced Tasso to determine to devote his life to literature, and he went to Bologna, where he studied philosophy and worked on his great poem, *Jerusalem Delivered*. After some years spent in the service of Cardinal Luigi d'Este, he received an appointment at the court of

Alfonso, duke of Ferrara. Here he lived happily for years, produced his pastoral drama, *Aminta*, and completed the *Jerusalem Delivered* (1575).

About this time he became a prey to morbid fancies and believed that he was persistently calumniated at court and systematically misrepresented to the Inquisition. To such a pass, indeed, did this mania come, that the duke was obliged to have him placed in confinement. He escaped and fled from



TASSO

Ferrara, but again returned. So outrageous had his conduct now become, that he was seized by the duke's orders and confined as a madman. He remained in the asylum from 1579 to 1586, until he was released at the solicitation of Vincenzo Gonzaga. Broken in health and spirit, he retired to Mantua and then to Naples. Finally, in 1595, he proceeded to Rome, at the request of the pope, who desired him to be crowned with laurel in the capitol, but the poet died while the preparations for the ceremony were being made. Tasso wrote numerous poems, but his fame rests chiefly on his *Rime*, or lyrical poems, his *Aminta* and his *Jerusalem Delivered*.

TASTE. The sense of taste is located in the tongue and in the upper and back parts of the mouth. The special organs of taste are minute branches or filaments of the nerve of taste, or *gustatory* nerve. These filaments exist in three forms, they are threadlike, a form most numerous on the first two-thirds of the tongue; mushroomlike, found principally on the tip and sides of the tongue; and V-shaped; the latter are only ten or twelve in number and are located near the base of the tongue. The sense of taste is so closely related to the sense of smell that we cannot distinguish some articles by taste alone. Close the nostrils and blindfold a person and he cannot tell claret from vinegar, for instance; occasionally one cannot tell cold apple from cold potato. We can taste only those substances that are soluble. Glass has no taste, because we cannot dissolve it.

There are four sensations of taste—sweet, sour, bitter and salty, all other tastes or flavors are combinations of these. The pleasing effect of lemonade, for instance, is due to a combination of sugar, lemon juice, the odor of lemon and cold water. We often attribute other sensations to the sense of taste, especially that of temperature. We do not care for cold soup, and we prefer not to eat ice cream that has melted.

The larger the area covered by the substance, the keener the taste; therefore, when one wishes to experience the pleasure of an agreeable taste, he spreads the substance over as large an area as possible. On the contrary, when one wishes to escape the unpleasantness of a disagreeable taste, he swallows the substance as quickly as possible. The sense of taste is injured by overstimulation. Highly seasoned food and such articles as tobacco, wine, beer and alcoholic liquors tend to deaden the nerve filaments so that mild flavors produce little or no effect upon them, and a person so affected constantly demands more highly seasoned food to "tickle his palate." The sense of taste can be highly educated as is shown in the development made by buyers of butter, tea, wine and other articles of food. See SMELL; SENSES, SPECIAL; TONGUE.

TAT'ARS. See TARTARS.

TATTOO'ING, the barbaric practice of pricking indelible patterns in the skin. While among some primitive peoples it is done merely for decorative purposes, for others it has a religious significance. Among some isolated peoples degrees of rank are indicated by tattooing. The skin is punctured with a steel, bone or steel point and some coloring matter is inserted in the wound. Sometimes several colors are used. Dark-skinned races employ a method of marking known as *scarification*; that is, gashing the skin and rubbing into it ashes or clay. This causes a light raised scar. Most sailors, even those of civilized countries, are tattooed on the back of the hand or on the forearm.

TAUNTON, *tahn'ton*, Mass., one of the county seats of Bristol County, thirty-six miles south of Boston, on the Taunton River and on the New York, New Haven & Hartford and several electric railways. It is essentially a city of homes, probably fifty per cent of the people having an equity in their own homes. This is brought about by coöperative banks and building and loan

associations. It contains a county law library and that of the Old Colony Historical Society. The public institutions also include Bristol Academy, Morton Hospital, an old ladies' home and one of the state insane asylums. The city hall, the county house, a Carnegie Library and a Federal building are the main public buildings. The city is the business center for a number of towns. The principal manufacturers are cotton goods, silverware, stoves and locomotives. The first successful iron works in America were established in Taunton, in 1853. Miss Elizabeth Pole found an Indian village here in 1637, called *Tecticut*, meaning Great River, and she purchased the land from the Indians for the first white man's settlement. It was called Cohannat, but was incorporated two years later under its present name. Robert Treat Paine, one of the signers of the Declaration of Independence, was a native of Taunton. It was made a shire town in 1746 and was chartered as a city in 1865. Population, 1910, 34,259; in 1920, 37,137, a gain of 8 per cent.

TAU'RUS (the bull), the second sign of the zodiac, which the sun enters about April 20. The constellation Taurus contains about 140 stars. In the northern hemisphere it is overhead in December and January, and in the spring it gradually disappears over the western horizon. The largest star of the group is Aldebaran, a red star of the first magnitude. Clustered about it in triangular formation are six other stars, called the Hyades. These are imagined as representing the face of the bull, and the two bright stars above them, the horns; the group known as the Pleiades, six of which are visible to the unaided eye, mark the bull's shoulder. The symbol of Taurus is $\mathbf{\text{♉}}$. See ASTRONOMY.

TAURUS, a mountain range in the southern part of Asia Minor. For the greater part of its course it follows the Mediterranean shore, and it forms the southern boundary of the great central plateau of Asia Minor. A branch of these mountains extending inland northeastward is known as the Anti-Taurus. Many of the Taurus peaks are more than 10,000 feet high.

TAUTOG, *taw'tog*. See BLACKFISH.

TAX, a contribution levied by legal authority upon private property or income to defray the expenses of government or for other public purposes.

A tax is said to be *direct* when it is demanded from the very persons who it is intended or desired should pay it, as, for example, a poll tax, a land or property tax, an income tax. It is said to be *indirect* when it is demanded from one person, in the expectation and intention that he shall indemnify himself at the expense of another; as, for example, the taxes called customs, which are imposed on certain classes of imported goods, and those called excise duties, which are imposed on home manufactures or inland production. A good illustration of a customs tax in America is a duty levied on tea and coffee. The importer pays the tax, but adds this amount to the original cost of the commodity and raises the price accordingly, so that in the end the tax is paid by the consumer. The tax on tobacco is an example of excise taxes.

In the United States and elsewhere, a tax on general property, both real and personal, forms the largest part of local revenues, municipal revenues being almost entirely raised from this source; while customs duties and excise duties furnish a large share of national revenue. Owing to the ease with which personal property may be concealed and the tax upon it avoided, the consequent inducement to perjury and the attendant injustice, many states of the Union have abolished it in part, substituting higher rates upon real estate, income, inheritances and certain kinds of traceable intangible property, such as franchises or mortgages. The poll tax has been abolished in over half of the states.

Principles of Taxation. Adam Smith laid down four principles of taxation, which have been generally accepted by political economists. These are: (1) The subjects of every state ought to contribute to the support of the government as nearly as possible in proportion to their respective abilities; (2) the tax ought to be certain, not arbitrary; (3) every tax ought to be levied at the time, or in the manner, most convenient for the contributor; (4) every tax ought to be so contrived as to take out and to keep out of the pockets of the people as little as possible over and above what it brings into the public treasury of the state.

Tax Sale and Title. If the owner of land fails to pay the taxes assessed on it within the time specified by law, the tax collector has authority to sell the land at public

auction for the taxes. The sale must be advertised and held strictly in accordance with the legal requirements, and it must be to the highest bidder, but in most states this means the bidder who will pay the taxes and cost of the sale. Time is given the owner to redeem his property, and the title granted the purchaser of the land does not become valid until this time has expired, when he is given a tax deed. The delinquent tax payer, in redeeming his land, must settle with the one who purchased it not with the tax collector.

Local Taxation. The state, county, township, school district, village and city are not allowed to raise money for expenses in any other way than by direct assessment of taxes upon the property of the people. The laws provide that all taxes levied shall be equitable—that is, that in any tax district each property owner shall pay in exactly the same proportion as any other who has taxable wealth.

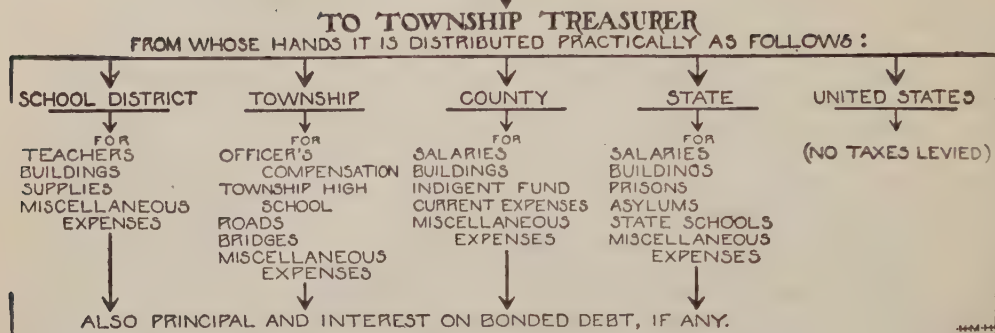
There are a number of taxing bodies drawing funds from each neighborhood; so it is a little difficult to explain in a brief article exactly how taxes are levied, collected and distributed.

In outlining the general system let us begin with the demands of the state. The legislature appropriates money to a certain fixed amount for the state's annual expenses. The various counties of the state are told their exact proportion of this sum, and when the county assesses the property within its limits to defray county expenses it must add to this sum the proportion demanded by the state.

The county board of supervisors or county commissioners decide how much the county may have for expenses and each township is called upon to raise its portion. The people of the township must make appropriation for their own expenses; the school district at the annual meeting declares what its outlay for the ensuing year shall be, and makes assessments accordingly.

Mr. A. owns a farm on which his taxes are \$100. He finds he must pay something for the support of the schools, whether or not he has children, for the government of his township, his county and his state. This is all right and proper, for from each he receives benefits in return. The amount he pays is apportioned somewhat as follows, the details varying a little in different states:

Mr. A's Tax \$100



In the above diagram the reader in Canada may substitute the words Province and Dominion.

If the taxpayer lives in an incorporated village or city his city or village tax is added to the other items, and he would pay his money to the city collector rather than to the township treasurer.

After all collections are made the various allotted proportions are sent to the proper authorities, to be spent according to the appropriations that have been made.

Related Articles. Consult the following titles for additional information:

Customs Duties	Inheritance Tax
Excise Tax	Poll Tax
Income Tax	Single Tax

TAXICAB, or, more properly, **TAXI-METER CAB**, a motor vehicle which is specially licensed to carry passengers for hire. It is equipped with an automatic device for registering mileage or time consumed for each trip and indicating the amount of the fare. Taxicabs are in use in all large cities, and the service is regulated by city ordinances. Legislation with reference to rates, the number of passengers allowed according to seating capacity of the cab, breakdowns, time consumed in waiting for passengers, etc., protects both the company and the public. The "taxi" rates in Chicago are said to be the lowest in the United States. The average charge of the larger companies in most of the large cities is twenty-five cents for the first half mile, ten cents for each additional half mile for one passenger, and a flat charge of twenty cents for each additional passenger.

TAXIDERMY, the difficult art of mounting the skins of animals so that they seem to

be lifelike copies of the live specimens. The expert taxidermist must understand natural history, drawing, sculpture, tanning, dyeing and several other branches to be able to do the work successfully; for the form over which the skin is placed after it is removed from the dead animal must be an exact reproduction (as to contour of the body) of the animal as it was in life. Therefore, in making a cast one must know as much about the animal's structure—its bones, muscles and flesh distribution—as the sculptor knows of human anatomy.

The first step in preparing a specimen is to remove the skin. This is done very carefully, to prevent any disfigurement or injury to the hide, hair, feather or scales, as the case may be. The cutting is so skilfully done that every part of the skin can be stripped, even to the ends of the toes. As soon as the skin is removed it is treated with arsenical soap. The preparation of the form on which the skin is to be mounted requires even more elaborate care. It necessitates in most cases the making of drawings of the animal and clay models before the final plaster or papier-mâché cast is made. When the skin is placed over the form it is put together in such a way as to conceal all the preceding steps in the process. The eyes of mounted specimens, formerly of glass, are to-day made of hollow globes, painted to give them a naturalistic expression.

Most of the expert taxidermists in America are trained in Rochester, N. Y., at a school of taxidermy founded by Professor

Henry A. Ward. The great natural history museums of Washington, New York, Pittsburgh, Milwaukee and Chicago contain some of the finest collections in the world, and the specimens of mounted deer, antelope, zebra, elk, caribou, moose and innumerable other animals are of unsurpassed workmanship. The amateur who is interested in preparing small specimens will find specific directions in taxidermists' guides and in government publications issued for free distribution.

TAY, the longest river in Scotland, and the largest, in volume, in the British Isles. It rises on the north side of the mountain known as Ben Lui, flows in a northeasterly direction through Loch Tay, then flows eastward, then southeastward, and finally enters the North Sea through the broad estuary known as the Firth of Tay. The entire length of the stream is about 120 miles. It is navigable for ocean vessels as far as Dundee and for smaller craft to Perth. Large towns on its banks are Dunkeld, Aberfeldy and Perth; its principal tributaries are the Almond, Earn and Bran and the Lyon, Isla and Tummel. The river is noted for its salmon fisheries and for the beauty of its scenery.

TAYLOR, BAYARD (1825-1878), an American writer and traveler, born at Kennett Square, Pa. He had a high-school education, then learned the printer's trade. At the age of twenty he visited Europe and tramped from place to place with a knapsack, supporting himself by contributing articles to home periodicals. These letters were later published in a book form under the title *Views Afoot*. Subsequently he traveled in much the same manner in Asia Minor, China, India, Japan and Egypt and revisited Europe. *By-Ways of Europe*, *A Visit to India*, *A Journey to Central Africa*, *The Land of the Saracens*, *Travels in Greece and Russia*, *Egypt and Iceland* and *China and Japan* are descriptions of these travels.

Taylor was secretary to the United States legation at Saint Petersburg (now Petro-

grad), at the time of the American Civil War, and in 1878 he became United States Minister to Germany, but died in Berlin shortly after receiving the appointment. In addition to those of his works already mentioned, some of the most notable are *El Dorado*, a description of California during the "gold fever;" *Hannah Thurston*, a novel and several volumes of poems, including *Lyrics and Songs*, *Lars*, a *Pastoral of Norway*, *The National Ode*, *A Book of Romances* and *Prince Deucalion*. By far his best work is a translation of Goethe's *Faust*, considered the best translation in the English language.

TAYLOR, JEREMY (1613-1667), a noted English author and divine, born at Cambridge and educated at Caius College. After taking holy orders he became chaplain to Charles I. and remained loyal to the king until the latter's execution. Afterwards he was a chaplain in the royalist army. With the Restoration came his appointment to the bishopric of Down and Connor, in Ireland, which he filled until his death. His works include *The Liberty of Prophesying*, *The Life of Christ*, *Holy Living* and *Holy Dying*, the last two considered the choicest classic of English devotion. Coleridge said, "Taylor is the most eloquent of divines; had I said, of men, Cicero would forgive me and Demosthenes nod assent."



BAYARD TAYLOR

TAYLOR, ZACHARY (1784-1850), a popular military leader whose achievements during forty years of army life, culminating in several brilliant victories in the Mexican War, made him President of the United States. He was fondly called "Old Rough and Ready;" for his thoroughly-good service in the field against the Mexicans he had been awarded a gold medal by Congress, so with popularity almost unbounded, in 1848 he became a national political figure.

His Early Record. Taylor was born on September 24, 1784, in Orange County, Va. His father, Richard Taylor, had been a colonel in the Revolutionary War; soon after peace was declared he moved to a new settlement which is now Louisville, Kentucky. Zachary was then an infant, and he lived in Louisville until twenty-four years of age. In 1808 his older brother, a lieutenant in the

Administration of Zachary Taylor 1849-1850

I. THE PRESIDENT

- (1) Birth
- (2) Ancestry
- (3) Youth
- (4) Military career
- (5) Views on public questions
- (6) Character
- (7) Death

II. THE COMPROMISE OF 1850

- (1) Public sentiment
 - (a) In the North and South
- (2) Terms of the Compromise
 - (a) California a free state
 - (b) Two territories organized without Wilmot Proviso
 - (c) Slave trade prohibited in District of Columbia
 - (d) Fugitive Slave Law
- (3) Great speeches on the questions
- (4) Immediate effects of the Compromise
- (5) Ultimate results

III. Other events of Taylor's administration

- (1) The Nashville Convention
- (2) President's opposition to spoils system
- (3) Death of Calhoun, March 31, 1850
- (4) Death of Taylor and inauguration of Fillmore

Questions on Taylor

When was Zachary Taylor born?

Who was his father? To what state did he move shortly after his son's birth?

Give a brief sketch of Taylor's military career.

What nickname was given him as a result of his methods of campaigning?

In a general way state the feelings of the country, North and South, with regard to the questions involved in the Compromise of 1850.

What were the terms of the Compromise?

What fugitive slave laws had been passed previous to the one of 1850?

army, died; Zachary was given his commission, and thus was begun a long, honorable military career. Two years later he was promoted to a captaincy. His next promotion was to the rank of major, for clear-headed defense of Fort Harrison, in 1812, against a strong force of Indians, with fifty men, most of whom were ill of fever. Thereafter during the War of 1812 his activity was against the Indian allies of England.

After that war he did pioneer work in the northwest, building forts and guarding settlers against unfriendly Indians. He was stationed at Prairie du Chien in 1832, and earned the rank of colonel in the Black Hawk War, in the years immediately following. When that trouble subsided, Taylor was sent to Florida (1836) to conquer the Seminoles, which was accomplished by their defeat at Okeechobee. This campaign gained for him the rank of brigadier-general and the command of all the troops in Florida.

In 1840 he was transferred to the command of the Southwestern division, and Louisiana became the field of his activities. When trouble with Mexico became a possibility, Taylor was ordered to Corpus Christi, Tex. (1845), and soon was engaged in the most serious military work of his career. The story of his successes in the crises then upon him is told in detail in the article MEXICAN WAR.

The Presidency. Fresh from a victorious campaign, "Old Rough and Ready," though never having held a political office, was named by the Whigs for the Presidency in 1848. He was easily elected over General Lewis Cass and Martin Van Buren, opposing candidates.

When Taylor became President in 1849 he frankly admitted that he possessed few of the qualifications which make a successful executive. But he had been for forty years a leader of



ZACHARY TAYLOR

men; he was deeply conscious of his responsibilities, and he had rare good judgment. His choice of advisers was highly commended, and he became at once a deep student of the theory of government, deter-

mined to transform himself from a fighter into an executive, so far as might be possible at the age of sixty-five.

How well he would have succeeded is problematical; he made no serious mistakes during his first year, and his courage and steadiness were supporting qualities which were carrying him safely along. However, when his second year was fairly begun, he died, on July 9, 1850, after an illness of five days. The only great political movement of his brief administration was that connected with the Compromise of 1850 (which see).

His Family. The wife of Taylor was the daughter of a Maryland planter. His son, Richard became a general in the Confederate army in the Civil War, and his daughter Sarah married Jefferson Davis, who had been an officer under Taylor in the war with Mexico.

See illustration of the administrations of Taylor and Fillmore, page 1323.

TCHAD. See CHAD, LAKE.

TCHAIKOVSKY, *chi koï'ski*, PETER ILYITCH (1840-1893), the greatest musician Russia has produced, was born at Votkinsk, in the Ural region. He studied law and obtained a position in the Ministry of Justice, but his love for music turned him to a musician's career. Accordingly, he resigned his position and entered the conservatory that was under the direction of the great Rubinstein. In 1866 he became teacher of harmony at the Moscow Conservatory. He began composing, and wrote numerous compositions for the piano. At first his works were not appreciated, but, undaunted by criticism, Tchaikovsky kept on composing. His first concerto for the piano was played in Boston in 1875 by Hans von Bulow, on his first visit to America. Following this, his compositions covered a wide range, including symphonies, operas, overtures, songs and dances. Tchaikovsky was a man of culture and his works are of high order. Musical critics consider his "Overture Fantasie" to be his happiest work; the overture to *Romeo and Juliet*, *Manfred* and *Francesca da Rimini* represent him at his best. His operas are Russian, and his music is very popular throughout Russia. He was the master of orchestration, and his symphonies are favorites with great orchestra leaders.

TEA, the name applied to an oriental evergreen tree, to the leaves, a commercial article,

and to the highly-regarded beverage prepared from them. In its natural state the tree is widely branching and attains a height of thirty feet or more; under cultivation it is constantly pruned and kept at heights between two and six feet to increase the number of leaves. The leaves are dark green, shaped somewhat like those of the willow, and grow to be four inches long. The small, fragrant flowers are cream-colored and are shaped like a double rose.

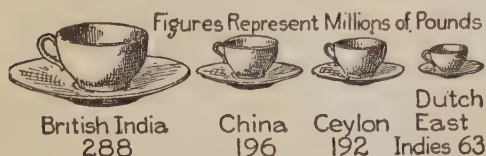
It is not known where the plant originated. The beverage was drunk by the Chinese as early as the sixth century. It was introduced into Europe in the seventeenth century. To-day the chief sources of supply are British India, China, Ceylon, Japan, Java and Formosa, which, collectively export 750,000,000 pounds a year. In India, Java and Ceylon tea is grown on large plantations several hundred acres in extent; in the other tea-growing countries it is cultivated on small pieces of ground and in gardens.

The plants are grown from seeds under cover, and when four or five inches high are set out in rows, there being about 1,500 plants to an acre. The plants are commercially profitable when three years old and reach full productivity at the age of five years. The crop is gathered three times a year, the second harvest yielding tea of the finest quality. The leaves are picked mostly by women and girls. They are then dried and withered and afterwards fired.

Different grades of tea are prepared from leaves of the same plant. They are all divided into two classes—green teas and black teas.

To prepare what is commercially known as green tea, the leaves are roasted almost immediately after they are picked, rolled by hand to crack the veins and set the acids, and are then dried quickly to preserve the color. Black teas go through a longer process of drying and roasting, and this causes them to turn black. The cheaper grades of green tea are often colored with Prussian blue, powdered tale or some other coloring substance. In India and Ceylon the leaves are machine-rolled (the more delicate leaves of the Chinese teas are not successfully prepared by machine-rolling, but are treated by hand). After the leaves are roasted, cutting machines break up the rolled leaves into small pieces. The leaves are then sifted and packed for shipment.

The chief consumer of tea is England, which uses almost twice as much as any other country. In 1918, over 84,000,000 pounds were produced for the British army alone, not including the troops in India. Other tea-drinking countries are Japan, the United States, Russia and Canada. Practically all the tea for the British market is supplied by India. Although Chinese tea is of superior delicacy and flavor, the Chinese tea trade has



EXPORTS OF A YEAR

steadily declined, owing to British enterprise and competition in India. In 1917 China's tea exports were only 150,000,000 pounds, and by 1921 they had fallen to about 50,000,000 pounds. Much of its American tea trade has been diverted to the British and Dutch East Indies, which, in 1918, supplied the United States with half of its tea, the total import for the year being 151,315,000 pounds—the largest known for that country. The quantity of tea consumed is increasing rapidly. The extensive prohibition of the manufacture and sale of intoxicating liquors in the United States has resulted in an appreciable expansion of the tea trade. In fact, the reduced consumption of alcoholic beverages in many countries is so increasing the consumption of tea that the world's demand will exceed the possible supply for some years to come.

TEACHERS' INSTITUTE, a meeting of teachers held for the purpose of giving instruction in devices and methods of teaching. The institutes are usually held during the summer months and continue for one or two weeks. The county is the unit for the institute, which is usually in charge of the county superintendent. Educators of experience are employed as instructors. In some states attendance upon the institute adds to the teacher's standing in her examination for a certificate.

TEAK, *teek*, a tree of the verbena family, found in Southeastern Asia and adjacent islands. It grows to an immense size and is remarkable for its large leaves, which are from twelve to twenty-four inches long and from six to eighteen inches broad. The wood, though porous, is strong and durable; it is

easily seasoned and shrinks but little. It contains a resinous oil, which enables it to resist the action of water and to repel the attacks of insects of all kinds. It is extensively used in shipbuilding, furniture making and for many other purposes. Mahogany is perhaps the only more valuable wood.

TEASEL, *te'z'l*, a thistlelike plant with long, stemless leaves, prickly stems and sharp bracts surrounding the flower heads. The seed vessels are covered with strong, sharp spines that are slightly curved at the point. The heads, which are used for raising the nap on cloth, are cut in two and attached to a cylinder which is made to revolve against the cloth. The large heads are used for the nap on blankets, the next in size for cloth for men's clothing, and the smallest size for broadcloth and fine woollens. No mechanical device has been invented which takes the place of this plant. The teasel is native in Southern Europe and is widely cultivated.

TEBRIZ, *ta breed'*. See **TABRIZ**.

TECHNICAL AND INDUSTRIAL EDUCATION. See **VOCATIONAL EDUCATION**.

TECK, *tek*, ALEXANDER AUGUSTUS FREDERICK, PRINCE OF (1874-), an English army officer, brother of Queen Mary. In 1914 he was announced as the new Governor-General of Canada, to succeed the Duke of Connaught, but at the outbreak of the World War he was ordered to the front, where he was promoted to the rank of colonel for bravery in action. He married in 1904 Princess Alice of Albany, granddaughter of Queen Victoria. His Highness was educated at Eton and Sandhurst. He served in the Matabeleland campaign of 1896 and in the South African War in 1899 and 1900, when for valiant services he won the Queen's medal and was honored with the Distinguished Service Order.

TECUM'SEH, or **TECUMTHA** (1768-1813), a celebrated Shawnee Indian chief. In 1805 he began to formulate his plans for organizing the Indians of the West into a confederation, and about 1811 he had collected a large force on the Wabash River. The defeat of his brother by General Harrison, at Tippecanoe, disturbed his plans, and he went to Canada at the outbreak of the War of 1812 to aid the British. He was killed in the Battle of the Thames River.

TE DE'UM, a famous Latin hymn, named from its opening sentence *Te Deum Laudamus* (We praise Thee, O Lord). It is one



TEA AND COFFEE

1A Tea Plant
2A Seed
3A Fruit (upper side)

4A Fruit (lower side)
5A Flower (longitudinal section)

1B Coffee Plant
2B Ripe Berries (Porto Rico)
3B Ripe Berries with pod removed

4B Fruit (cut to show the berries)
5B Flower (longitudinal section)

of the most solemn and majestic hymns ever written. The authorship is unknown, but the majesty of its words has inspired many of the great composers to exercise their genius upon it. The *Te Deum* is usually sung in the Roman Catholic churches on occasions of rejoicing and thanksgiving.

TEETH, the hard, bony appendages which are fastened to the jaw in most vertebrates, and assist in mastication. In man and the higher mammals two sets of teeth are developed, the temporary, milk or deciduous teeth, and the permanent set. In fishes the



TEETH

1, incisors; 2, canine; 3, bicuspids; 4, molars (the molar at left is the "wisdom" tooth); 5, a blood vessel; 6, a nerve.

teeth fall off and are renewed repeatedly. In man the teeth are imbedded in sockets in the upper and lower jawbones. There are thirty-two in all, sixteen in each jaw. The four central teeth, or *incisors*, have chisel-shaped crowns, with sharp edges; on each side of these four is a pointed *canine* tooth, which in the upper jaw is called an eye-tooth; on each side of these two are *bicuspids*; then come the *molars*, three on each side. The last of these molars, owing to their arrival between the seventeenth and twenty-fifth years, are called *wisdom teeth*.

Each tooth has a crown, the visible part, and a root or fang, the hidden part. The central cavity is filled with a soft pulp, containing blood-vessels and nerves. Dentine, a hard substance, composed of phosphate and carbonate of lime, makes up the greater part of the tooth. The outer covering of the fang, called *cementum*, is a substance resembling bone, while the covering of the crown is a hard enamel. In young teeth the enamel is covered by a delicate membrane, called the "skin of the teeth," which is worn off in adult life. If the enamel which covers the tooth becomes cracked or broken, the underlying dentine is exposed and soon

breaks down; and when the decay reaches the pulp which contains the blood-vessels and nerves, toothache results.

By constant and regular care of the teeth, much pain and suffering may be avoided. After every meal the teeth should be cleaned with a brush and plenty of pure water. Some simple tooth wash or powder, which contains no injurious substances should be used. Children should be taught to clean their teeth every day, at least, so as to avoid decay and to preserve the general health, which is often injured by unhealthy conditions of the teeth and gums. A dentist should examine a person's teeth at least once a year, that he may repair any decay before it becomes serious. See DENTISTRY.

TEGNER, *teg nair'*, ESAIAS (1782-1846), a Swedish poet. He studied at the University of Lund, became professor of Greek literature there and later was appointed bishop of Wexio, where he died. Among his works the most important in his *Frithjof's Saga*, an epic poem, repeatedly translated into English. Longfellow translated it, as he did also *The Children of the Lord's Supper*.

TEGUCIGALPA, *tay goo se gahl' pah*, CENTRAL AMERICA, the capital and largest city of the republic of Honduras, on the Choluteca River, about seventy-eight miles from its mouth. It is in an important agricultural region, and the mineral resources of the surrounding country, while not as great as formerly, are still considerable. Its most imposing buildings are its cathedral, a national university and a seminary. Population, 1914, 28,950.

TEHERAN, *teh rahn'*, PERSIA, the metropolis and capital of the country, situated seventy miles south of the Caspian Sea, on an elevated plateau about 4,000 feet above the sea. The city is near the snow-covered Elburz Mountains, and is enclosed by a wall which has twelve gates. The town is poorly built, and most of the dwellings are low mud structures. There are numerous mosques and bazaars. The newer part of the city has modern boulevards lighted by gas, and it is traversed by street railways. These present a marked contrast to the filthy, narrow streets of the older portion. The region is made productive by water drawn from the mountains through underground canals. The important buildings are the royal palace, the government buildings connected with it, and the royal museum, housing jewels of great

value. The population in winter is about 280,000. In summer, many of the inhabitants remove to a more healthful location.

TEHUANTEPEC, *ta wahn ta pek'*, ISTHMUS OF, the narrowest part of Mexico and the narrowest part of North America, north of Costa Rica, lies between the Gulf of Campeche, an arm of the Gulf of Mexico, west of Yucatan, and the Gulf of Tehuantepec, on the Pacific. It is 120 miles wide at its narrowest point, where a valley between the mountains reduces the altitude to less than 1,000 feet. In 1907 a railway was completed across the isthmus from Coatzacoalcos, on the Atlantic, to Salina Cruz, on the Pacific. The line is 150 miles long and is operated jointly by the English construction company and the Mexican government.

The narrowness of the isthmus made it of interest to the world's mercantile interests at an early day, and the feasibility of an interoceanic canal to cross it was discussed for a century. Later another route farther north, at a wider point, was deemed more desirable, because Lake Nicaragua and a river system could be utilized. For particulars of this discussion and efforts growing out of it, see NICARAGUA CANAL. All of these projects were finally rejected in favor of a lock-system canal at Panama.

TELAUTOGRAPH, *tel aw' toh graf*, an instrument for transmitting writing by means of electricity, invented by Professor Elisha Gray. It consists of a transmitter and a receiver connected by wires. The transmitting apparatus is contained in a metal box intended to rest on a desk or table. The writing is done on a sheet on top of this, with a metal stylus which in appearance resembles a lead pencil. To a groove near the point of this stylus are attached, one on each side, two silk threads, which are connected with the transmitting wires and which convey the movement of the stylus to them. The receiver is held in an upright metal frame with the sheet exposed on one of its broad, flat sides. On this the writing is recorded by means of a pen connected with the receiving wires, and a *facsimile* of the writing is instantaneously reproduced. This little device is extensively employed in department stores, government offices and clubs to transmit instructions from one department to another. It is invaluable in banks as a means of transmitting signatures at a distance.



TELEGRAPH, *tel'e graf*. "What hath God wrought?" Little did Annie Ellsworth, the author of that first telegraph message given to the world, realize the fullness of its meaning, in connection with the wonderful device used in its transmission from Washington to Baltimore in 1844. To-day there are in the United States more

than 1,814,000 miles of telegraph lines. These lines are served by over 31,000 offices and carry over 103,000,000 messages a year. Canada has about 54,000 miles of wire, over which over 12,000,000 messages are sent yearly. The combined telegraph systems of the world include over 5,875,000 miles of wire, or enough wire to extend 231 times around the earth. In addition to the lines on land, there are over 236,300 miles of telegraph cables, binding together the continents and linking the islands of the sea to centers of civilization.

So far as communication is concerned, the telegraph has done away with distance, for a signal can be sent around the earth in less than a minute or across a continent in the winking of an eye. The telegraph has made distant nations neighbors, and has extended the influences of civilization to the remotest parts of the earth. Our morning paper contains the news of the world, and within an hour or less from the time an important event occurs in Europe, Asia, Africa, Australia or the Philippines, news of it is in the office of every important newspaper of the world, because there is a telegraph station within easy reach of the place where the event occurred.

In its broadest meaning, the term *telegraph*, which means to *write far off*, includes all devices for communicating by signals that represent words; however, since the electro-magnetic telegraph has practically displaced all other devices, the meaning of the term is now restricted to that device.

Electro-Magnetic Telegraph. The electro-magnetic telegraph consists of the following essential parts: (1) a battery or other source for generating an electric current; (2) a line wire or other conductor for conveying the current from one station to another; (3) an

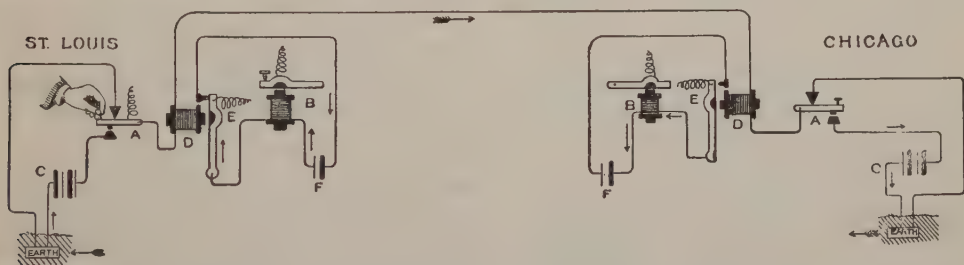
apparatus for transmitting the message, and (4) an apparatus for receiving the message. The line wire usually consists of iron wire, which has been galvanized to protect it from the weather, and it is supported upon poles from twelve to twenty feet in height, being attached to them by glass or porcelain insulators. Theoretically there should be two wires, in order to complete the circuit, but in practice the earth is made to take the place of one of these, by attaching the wire leading from one pole of the battery to an iron plate buried in the ground or to the rails of a railway track.

The transmitting apparatus consists of a lever, placed on a pivot; it has a knob on the upper side of one end, and immediately under this is a wire containing a platinum point, which, when the lever is pressed down, meets another similar point on the table, connected with the opposite pole of the battery. The receiving apparatus consists of a core of soft iron, wound with a coil of insulated wire, thus making an electro-magnet; and above this is an armature, which is attached to a lever that has an upward and downward motion.

The principle upon which the telegraph operates is that of the making and unmaking of an electro-magnet, by the passage and interruption of the current. The diagram shows the various parts of a telegraph, in

so that the lever strikes upon a metallic point with a sharp click. As long as the key at Saint Louis remains closed, the lever on the sounder in Chicago will remain attached to the magnet, but the instant the transmitting key is opened, the circuit is broken, and the spring in the sounder *B* brings this lever back into its former position. Thus the vibrations produced by the operator at Saint Louis are exactly reproduced in the sounder at Chicago, and the operator at that station reads the message by the sounds produced in his instrument.

In nearly all telegraph stations there is an additional apparatus, known as the *relay*. This is represented by *D* in each station. The relay is simply an electro-magnet of greater power than that used in an ordinary sounder. This magnet is connected with the local battery and is used along the line when the distance is so great that the current from the ordinary working battery is not strong enough to carry the message successfully from one station to the other. The relay is connected with the local battery, and in case of transmitting the message from Saint Louis to Chicago, by means of the relay, a weaker line battery can be successfully used. The current passing through the relay at *D* attracts the lever *E* in the same manner that the lever of the sounder is attracted.



such relative position as to indicate the equipment of two stations. In each station *A* represents the transmitting lever, known as the *key*; *B*, the receiving apparatus, or *sounder*, and *C*, the battery. When the operator in Saint Louis wishes to transmit a message to Chicago, he presses down the key, which is ordinarily held up by the spring. As the platinum point on this key connects with the metallic point beneath it, it closes the circuit and sends a current over the line wire to the station in Chicago. This magnetizes the electro-magnet in *B* at that station and causes it to bring down the armature above,

This makes a connection between the line battery *C* and the local battery *F*, which is also connected with the sounder, and when the relay is used the sounder has the benefit of the current from the local battery and is thus easily operated, while without this aid it would fail to respond to the movements of the transmitting key at a distant station.

Rapid Telegraphy. In large cities and on lines having a great amount of business messages cannot be transmitted with sufficient rapidity by this apparatus, hence devices for rapid telegraphy have been invented. The device in most common use consists of a

transmitting and receiving apparatus constructed on a similar plan and moving with the same rate of speed. The message is prepared on a paper tape, by a machine containing keys similar to those on the typewriter. The dots punched out on this paper correspond to those in the telegraph alphabet. The transmitting machine contains an electric brush, which comes in contact with the rim of a steel wheel. The paper forms an insulator between the brush and wheel, except where the dots appear. As this tape is run over the wheel, the dots complete the circuit, which is indicated in the receiving apparatus by a steel point, which passes over a similar tape, chemically prepared, so that whenever the electric current passes through it a bluish-black dot or dash will be made. Thus the message is reproduced in the telegraph alphabet. By means of this apparatus many times the number of words can be transmitted in a given time that would be possible by the ordinary operating key.

Multiplex Telegraph. In 1872 Thomas A. Edison invented a device for sending two messages in opposite directions over the same wire at the same time. Since that time this invention has been perfected and extended, so that four or more messages are readily sent at once over the same line. In 1919 further improvements of the multiplex system made it practicable to use the same wire for both telegraph and telephone purposes at the same time. Five telephone conversations or five telegraph messages can be transmitted simultaneously, or the wires can be used for both telephone and telegraph messages at the same time.

Printing Telegraph. The "stock ticker" seen in brokers' offices and banks is a printing telegraph which writes its messages on a tape. It is used for sending quotations from the stock exchanges to their patrons. The printing telegraph operates on very much the same principle, and delivers the message in printed or typewritten form. The operator sends the message by operating a typewriter keyboard as though he were writing a letter. In some forms a specially devised typewriter receives the message. Each key in the receiving typewriter has a small electro-magnet attached to it. Each of these magnets responds to the electric impulse of the corresponding key on the sending machine and to no other, so that the letters struck by the operator are reproduced

on the receiving machine. The operator does not need to know the Morse code.

Boys' Telegraph. Crude telegraph instruments can be made by any boy who is acquainted with the fundamental principles of electricity, but they are seldom satisfactory. Many firms have on sale inexpensive sets of telegraph instruments, with full directions for installing an amateur telegraph line, and boys interested in learning telegraphy by themselves are advised to consult these dealers.

History. Several attempts were made to invent a telegraph previous to 1831, but none was successful. In that year Prof. Joseph Henry discovered that a piece of soft iron could be instantly magnetized by passing an electric current through a coil of wire surrounding it; also that it could be as quickly demagnetized by breaking the circuit. The following year Prof. Samuel F. B. Morse conceived the idea of making use of this principle as a means of communication, and while on the return voyage from Europe he made the drawings and perfected the plan for the necessary apparatus. Professor Morse gave his first exhibition of this apparatus in 1837. Three years later a patent was obtained, and the inventor applied to Congress for an appropriation to construct a telegraph line from Washington to Baltimore. The majority of Congressmen did not believe that Morse's idea was practicable, and it was not until some years later that the desired appropriation was secured. The first telegraph line was completed in May, 1844, and its success far exceeded the expectations even of the inventor. In the perfection of his apparatus Professor Morse was assisted by Professor Henry and Mr. Alfred Vail, a skilled mechanic.

The system of signals known as the Morse Alphabet then adopted has remained in use. It consists of a series of dots and dashes which represent the letters and figures in ordinary use. The first instrument used a receiver which recorded the message on a paper tape that passed over a cylinder, down upon which a pencil point was brought when the circuit was closed; but operators soon discovered that they could read more rapidly and accurately by the ear than by the eye, and this form of receiving apparatus was replaced by the *sounder*, now in almost universal use. The tape receiver is still retained

for recording stock quotations and those from other market reports and for a few other special purposes. The additions to Morse's invention have been for the purpose of extending its usefulness and have not in any way modified the principle upon which his plan was based. The electric telegraph is now in use throughout the civilized world, and ocean cables have been laid to such an extent that it is possible to communicate with almost any part of the world within the space of a few minutes.

Related Articles. Consult the following titles for additional information:
 Cable, Submarine Morse, Samuel F. B.
 Edison, Thomas A. Telautograph
 Electro-Magnet Telegraph, Wireless
 Electro-Magnetism Telephone

TELEGRAPH, WIRELESS, or Radio Telegraph: This is a system of signalling by means of waves in the Ether. Wireless or Radio waves, which are similar to the waves we call light, but much longer, can be produced by an electric spark or by rapidly alternating electric current.

Transmitting Apparatus. There are two types of transmitters: 1. Spark transmitters, 2. Undamp wave transmitters. The first (see fig. 1.) may consist of an induction

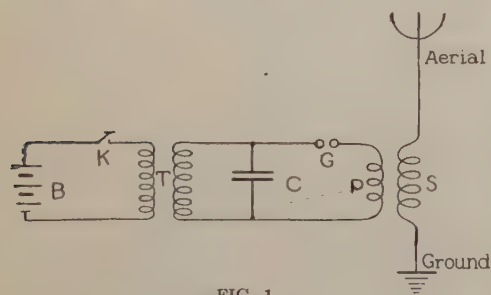


FIG. 1.

coil or transformer (T); battery (B), or current from a power line; key (K); condenser (C), which consists of metal sheets separated by insulation; spark gap (G); a few turns of heavy wire (P-S); the aerial (Ar.); and ground (Gr.). The manner in which this apparatus causes waves in the Ether is as follows: When the key is pressed, high-voltage electricity from the induction coil charges the condenser, which then shoots its charge across the spark gap and thru coil P, first in one direction and then in the other, at high speed. This induces similar electric currents in coil S, and these flow rapidly up and down in the aerial, and to the ground. As a result, the Ether

between the aerial and ground is shocked into vibration, and waves spread in all directions with the enormous speed of 186,300 miles per second. The number of waves sent out in a second can be regulated by changing the number of turns of wire on coil S, or by changing the size or height of the aerial. The waves from a spark transmitter occur in groups, one group for each spark, and are called damp waves, because the successive waves in each group are weaker. See fig. 2 (A).

Undamp Wave Transmitters send out

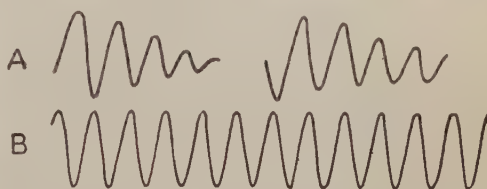


FIG. 2.

waves which are all alike in strength and do not occur in groups. Fig. 2 (B). They can be produced by: 1. High-frequency generators, huge electrical machines similar to the dynamos used in power houses to generate electricity; 2. Arc-lamps; 3. Vacuum Tubes. The last are also used for receiving, and a description will be found under Receiving Apparatus.

The Aerial. The aerial may consist of one or more wires elevated above the station, or a loop a few feet across, inside the building. Elevated wires are used for transmitting, and usually for receiving also, but a loop may be used for receiving. The wires are often placed side by side horizontally, but may be vertical, fan-shaped, or arranged radially like the ribs of an umbrella. The higher the aerial is, the farther the waves will travel.

Receiving Apparatus. Two types of receiving instruments are in common use; The first has a crystal of some mineral such as galena, silicon, or carborundum, as the detecting element, while the other has an audion as the detector. A crystal receiving set (fig. 3) usually consists of an aerial and ground; tuning coil (T); crystal detector (D); condenser (C); and telephone receivers (P). The Ether waves from a transmitting station cause electric currents to flow up and down in the aerial wires, and thru the tuning coil. The detector acts as a valve, allowing current to flow thru it in one direction, but not in

the other. Thus pulsing direct current flows thru the telephones, which give a buzzing sound, broken up into dots and dashes. A receiver of this type will detect messages from a spark transmitter, but not from an undampt wave transmitter.

An Audion detector, on the other hand, will receive messages from any kind of transmitter. Fig. 4 shows a typical circuit using an audion as a detector. The audion is a glass bulb, similar to an electric light bulb, from which the air has been removed, and in which are three metal elements, the filament, plate, and grid. The filament is heated by current from a battery (A), and a second battery (B) causes a flow of current thru the bulb from the filament to the

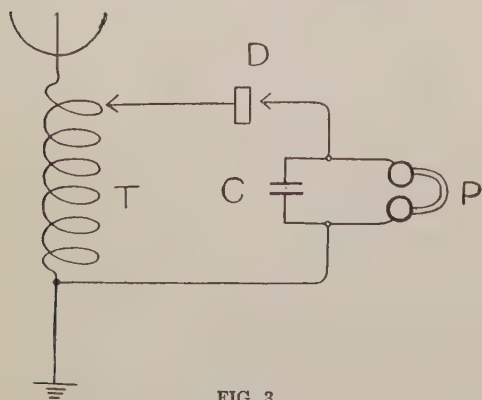


FIG. 3.

plate. This detector acts as a very delicate relay, for when electric currents are induced in the aerial by passing Ether waves, the "B" battery current thru the tube is caused to rise and fall, and thus to operate the telephones. In order to receive undampt waves, the audion must oscillate, i.e. make electric currents flow rapidly back and forth thru its coils. This happens when coil T is placed close to coil S. In this condition the set is not only a receiver, but a transmitter of undampt waves, and when large tubes are used, and proper adjustments made, messages may be sent for long distances. If undampt waves cause currents in the aerial while the receiving circuit is oscillating, the two effects combine and give a clear musical note in the telephones.

Tuning. A receiving set may be adjusted to respond to any particular wave desired, by simply changing the number of turns of wire used on the tuning coil, by means of a switch or slider, or by adjusting

the variable condensers (V.C.) shown in fig. 4. Thus if several transmitters are sending out waves at the same time, each with a different wave length, the receiver will respond to only one of them, when a certain number of turns of wire or size of condenser is used. If these are adjusted to other values, some other transmitter will be heard.

Power and Range of Transmitters. The power used in sending messages across the oceans is several hundred horse-power, and the range of the giant coastal stations is 5,000 to 12,000 miles. Amateur stations use less than one horsepower. The range of any radio transmitter is greater at night than during the day, and greater over water than over land. It also depends largely upon the sensitiveness of the receiving instruments used.

History. Long Ether waves were discovered by Heinrich Hertz, a German scientist, in 1887, but no practical use was made of them at that time. In 1895 Marconi of Italy began experimenting with wireless waves, and produced the first practical transmitter. In 1897 he succeeded in sending a message over a distance of 15 miles, and in 1901 sent the first message across the Atlantic Ocean.

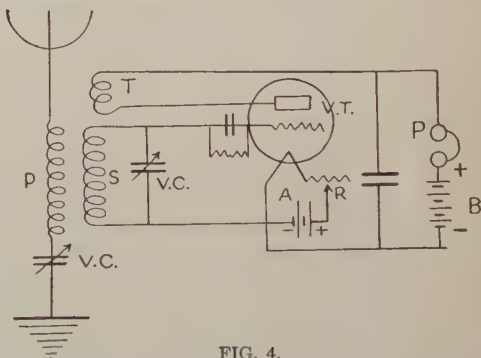


FIG. 4.

The three element vacuum tube or audion was perfected in 1906 by DeForest, and with its introduction as a detector, a new era in Radio Telegraphy began. The audion is one of the most important inventions of the last 100 years, for it has revolutionized wireless telegraphy, made possible the recent great development of the Radio Telephone, and has many other important uses.

Comparison with Line-Telegraphy. In line-telegraphy the electric impulses follow

a wire, and can be received only by stations which are connected to the wire. Wireless waves on the other hand, spread in all directions and can be detected by any station within range, which is tuned to the correct wave length. Thus secrecy is only possible by the use of secret codes. Much greater power is required to send wireless messages than is needed in line-telegraphy.

Code. The code used in wireless telegraphy is the Continental or International Morse Code.

Uses. Many lives have been saved by the use of Radio in summoning aid to sinking or disabled vessels. Mariners on board vessels lost in a storm can locate their position with reference to land by the use of direction finders which indicate the direction from which radio signals come.

Related Articles: Consult the following titles for additional information:

Electricity	Telephone
Marconi, Guglielmo	Telephone, Wireless
Telegraph	

TELEMACHUS, *telem'a kus*. See ULYSSES.

TELEPATHY, *te lep'a thi*, a term used to denote the influencing of one mind by another, without the use of ordinary means of communication. It is closely related to clairvoyance (which see). Some persons seem to have the power of communicating to others, at a distance, what is happening to them, "often without any intention or consciousness of doing so on their own part." Occasional incidents of this sort, a knowledge of the fact that the mind is aroused to activity by intuition as well as by impressions received through the senses, and belief in clairvoyance, have led some people to believe in telepathy as an established fact.

Most careful investigations by the Society for Psychical Research led the investigators to the conclusion that in most instances there was a means of communication between the parties which the observer could not detect. For instance, when A and B are in the same room, the experiment succeeds more frequently than when they are in separate rooms. If A wills that B write the number 10, B must have this number in his mind as A wills him to write it. When A and B are in the same room the number willed is written correctly more times than can be accounted for by chance, but when they are in separate rooms the experiment does not succeed more frequently than it would by chance.

The evidence in favor of telepathy is not yet sufficient to warrant acceptance of the theory, although it has some ardent supporters. See SUPERSTITION, and list of related articles.



TELEPHONE, *tel'e fone*.

The word *telephone* means to talk far off, and the term is applied to all devices by which the sound of the human voice is carried to a distance. The simplest telephone consists of two vibrating membranes, connected by a cord passing through small openings in the respective centers. Such a telephone is easily made with two tin fruit cans. Punch a small hole in the center of one end of each can, the other end being removed; join them by a twine, held in place in each can by a large knot, and draw the cord taut. Conversation can be carried on through this instrument at a distance of several hundred feet, and disks of membrane specially mounted for this purpose and joined by copper wire will work successfully for a mile or more.

The Electric Telephone. The electric telephone was invented by Alexander Graham Bell and was first exhibited to the public in 1876 at the Philadelphia Centennial Exposition. The essential parts are the transmitter and the receiver. The transmitter

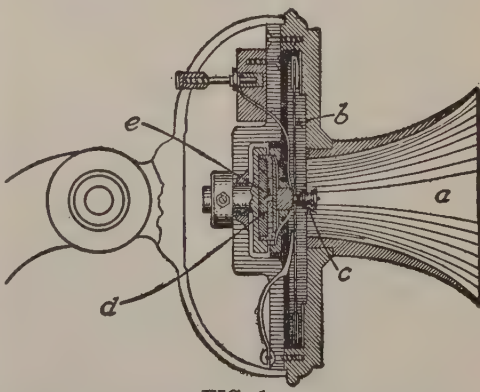


FIG. 1.

(Fig. 1). consists of a funnel-shaped mouth-piece, directly back of which is a metal disk. A button of hard carbon is attached to the center of this disk on its inner surface; opposite to it and fastened to the frame of the instrument is a second button. The space

between these buttons is filled with granulated carbon. These buttons are the electrodes of the transmitter, the current passing from one to the other by means of the granulated carbon. By this device the vibrations produced in the metal disk by the voice of the speaker are exactly reproduced. The receiver (Fig. 2) consists of a straight or bar electro-magnet with a coil at the end next to the metal disk and having only one pole. By completing the circuit through the carbons in the transmitter, the disk in the re-

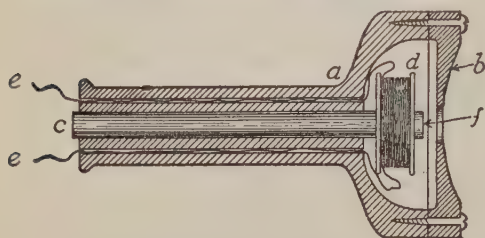


FIG. 2.

ceiver is caused to vibrate in unison so the voice of the speaker, including accent and inflection, is heard by the one holding the receiver.

The telephone has been brought to such a degree of perfection that the voice of a friend more than 1,000 miles away can be heard and recognized as readily as though he were speaking in an adjoining room with the connecting door open, even when he speaks in an ordinary tone.

The Switchboard. Like many other inventions, the telephone has far exceeded in usefulness the greatest anticipations of the inventor. It was designed for use by two parties only, one at each end of the line, but in 1877 Mr. G. G. Hubbard conceived the idea of the switchboard by means of which the lines of a large number of subscribers could be so connected that any subscriber could talk with any other subscriber connected with the system. It was Mr. Hubbard's idea that made possible the great telephone systems with which we are all familiar. The telephones of all the subscribers in a section of a city or in a given area in the country are connected to form an *exchange*. *Trunk lines* connect the exchanges, and by means of this arrangement any subscriber can be connected with any other subscriber in large areas of the United States and Canada.

Automatic Telephone. The automatic telephone is provided with a self-operating

switchboard. Each transmitter has a dial with the figures 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 on its disk. The person wishing to call a number inserts his finger into an opening opposite the first figure in the number desired and turns the dial as far as the stop; he then allows it to return to its former position, and repeats the process for each of the other figures. When he dials the last figure the number called will respond. The switchboard is somewhat complicated, but the automatic telephone is very successful for local purposes, and much less expensive than the manual system because it dispenses with operators at the switchboard.

Present Extent. As already stated, the first public exhibition of the telephone was made in 1876 at the Centennial Exposition. The most far-sighted journals of the country hailed this little instrument as one of the greatest inventions of the age; others ridiculed the idea of an invention by which men could talk with one another at a distance, and called the inventor a "crank." Within a year from that time, however, the telephone had begun to prove its worth, and in August, 1877, 778 telephones were in use. By 1898 fully 1,000,000 telephones had been installed in the United States alone. The expansion of the system has been phenomenal. In 1918 the United States had 22,610,487 miles of telephone wires and 100,376,000 stations, and the daily exchange connections exceeded 30,845,000. About \$1,065,000,000 was invested in telephone plants, and the total revenue was \$294,895,000. There were over 8,000,000 telephones in use in the world, and 5,000,000 of these were owned by the American Bell Telephone Company. Canada has over 890,000 miles of wires and 371,000 telephones in operation. The United States has nearly twice the number of miles of telephone lines found in all the other countries of the world, and San Francisco has the largest number of telephones in proportion to its population of any city in the world.

Special Uses of the Telephone. The telephone has a number of uses besides that of ordinary communication. The telephone fire alarm has displaced the old system. In war it is used to keep the commander in chief in touch with every part of his army. Special apparatus which can be quickly set up, taken down and easily carried, is made to accompany an army in the field. On warships the commander is in telephone communication

with every part of his ship. The telephone is in use on many railways in train dispatching. The helmets of divers are fitted with transmitters so that the diver can communicate with the boat above. Instruments have been so perfected that both telephone and telegraph messages can be sent over the same wire at the same time.

Related Articles. Consult the following titles for additional information:

Bell, Alexander G. Telephone, Wireless
Telegraph Telephone, Wireless

TELEPHONE, WIRELESS, or Radio Telephone. Any of the transmitters of undamped waves mentioned under Wireless Telegraph, may be used to send telephone messages, by the addition of apparatus for varying the strength of the Ether waves by the sounds made by voice or musical instruments. The sounds fall upon the metal diaphragm of a carbon microphone transmitter, similar to that used in the line-telephone. When the diaphragm is pushed in by sound waves, a strong electric current flows from a battery thru the microphone, but when the diaphragm springs out of its normal position, the current is stopped. These current pulses flow thru the Radio Transmitter, and cause the strength of the oscillations which it sets up in the aerial, and consequently the strength of the emitted waves to vary accordingly. When the waves reach a distant receiving station, the receiving instruments translate the variations of the waves back into sounds, similar to those spoken or played at the transmitter.

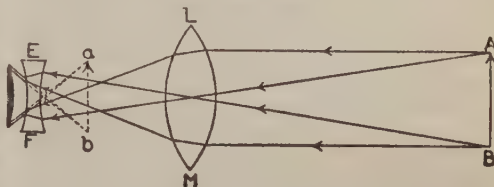
Radiophone Receivers. Any receiving instrument which will receive telegraph messages will also receive speech and music. If an audion set is used, such as is shown in fig. 4, the adjustment is the same as for receiving spark signals. See TELEGRAPH WIRELESS, page 3531.

Uses. Radiophones are extensively used for rapid communication between ships, aeroplanes, and moving trains. Experiments have shown the practicability of telephoning across the oceans, and doubtless soon a great deal of business will be transacted by this means. A novel and effective method of fighting forest fires involves the use of wireless telephones. Guards stationed on mountain tops report the fires by Radiophone, and when the fighters go out to extinguish the fire, their efforts are directed by aviators flying above, who are provided with Radiophone transmitters.

The most important and widespread use

of the wireless telephone is the broadcasting of musical entertainments, speeches, and information of public interest, such as weather reports, markets, and news.

TELESCOPE. *tel'eskohp*, an optical instrument for viewing distant objects, especially the stars. The simplest telescope, invented by Galileo in 1609, by which, though it magnified only thirty times, he was able to discover four of the satellites of Jupiter, con-



sists of a straight tube, with a double convex lens, *LM*, at one end, and a concave lens, *EF*, at the other (see illustration). The convex lens constitutes the object glass, and the concave lens the eyepiece. The eyepiece is placed between the objective and the image formed by it. Rays of light from the object *AB* are refracted by the objective *LM* and would form an inverted image beyond *EF*; but this lens tends to disperse the rays, and the eye sees the image at *ab*. The telescope tube is usually jointed, so that the eyepiece can be adjusted in order to obtain a sharp focus. Opera glasses and field glasses are made by joining together two telescopes of this pattern.

Modern astronomical telescopes are of two classes, the reflecting and the refracting. The *reflecting telescope* consists of a concave mirror, placed at one end of a tube of the same diameter. The tube is pointed toward the object to be viewed, and the image formed by the mirror is placed in the tube at the proper point, by a prism. This reflects the image so that it is viewed through an eyepiece in the side of the tube. Many of the early discoveries in astronomy were made by reflecting telescopes, but owing to the difficulty of their manipulation they have been almost entirely replaced by the refracting telescope.

The *refracting astronomical telescope*, while similar in construction to the smaller instrument, contains many accessories for the purposes of adjustment. The tube is supported on a standard and is so nicely balanced that it can be easily directed to any point in the heavens. It is connected with a sys-

tem of clockwork, by which it is enabled automatically to follow the motions of any heavenly body. The eyepiece is a convex lens, and it magnifies the image. The objective is very large, and it collects a large number of rays of light.

The most noted telescopes are those of the Yerkes Observatory, at Lake Geneva, Wis.; the Lick Observatory, Mount Hamilton, Cal.; the observatory at Pultowa, Russia, and the National Observatory, at Washington, D. C.

The Yerkes telescope is the largest refracting telescope in practical use. It belongs to the University of Chicago, having been presented to that institution by Charles T. Yerkes. The great lens has forty inches of clear aperture, is over three inches in thickness, and weighs 760 pounds. The tube is of sheet steel, forty-two inches in diameter at the objective end, fifty-two inches in diameter in the middle. It is sixty-four feet long, and weighs twelve tons. The pier on which the tube rests and revolves is of cast iron, and stands forty-four feet in height. The dome in which the telescope is situated has a diameter of eighty feet and a height of 100 feet. By pressing an electric button the observer can move the telescope in any direction. The floor of the observatory is also raised and lowered by electric power, at the convenience of the observer.

By the use of the marvelous instrument from the time of Galileo to the present, man has obtained a new idea of the vastness of the universe and the working out of its laws. The comprehension of his own place as a mere atom and not the center of all things has resulted in a profound and revolutionary change in his thought and philosophy. See ASTRONOMY.

TELL, WILLIAM, a famous peasant hero of Switzerland, now proved to have been a mythical personage. He is said to have belonged to the Canton of Uri, and to have united with others belonging to this canton and to the cantons of Unterwalden and Schwyz in resisting the Austrians. On his refusal to do homage to Gessler's hat, set upon a pole, he was seized and condemned to death, but he was granted his life on condition of shooting, with an arrow, an apple placed on the head of his own son. This he did successfully, admitting at the same time that his second arrow had been intended for Gessler in case of failure. He was therefore kept a prisoner, but while being conveyed

across a lake in Gessler's boat, he managed to leap ashore, and soon after killed Gessler, who had landed in pursuit of him.

TEM'PE, VALE OF, a narrow valley in the northern part of Greece, extending between Olympus, on the north, and Ossa, on the south. The river Salambria flows through the valley, and its scenery is remarkably beautiful. This valley was much celebrated by the ancient poets.

TEMPERANCE, originally moderation in the use of all things; in popular language, moderation in the use of alcoholic liquors, or total abstinence. Among primitive people excessive use of intoxicants has always been associated with religious rites, and indulgence in an appetite for liquors has been prohibited. Among the ancient Chinese, Carthaginians, Persians and Hebrews there were laws against excess, and the Buddhists taught total abstinence. In modern times the temperance movement has often had a deep religious significance, but its appeals have been based chiefly on grounds of health, economy and morality. The United States, Great Britain, Norway and Sweden, Germany, France, Austria and many other nations now have organizations whose object is to lessen or destroy the consumption of liquors and to secure the passage and enforcement of laws which aid this result. For the extent of the movement against the liquor traffic see the article PROHIBITION.

TEMPERATURE, the state of a body as regards heat and cold, shown by its ability to communicate heat to other bodies, and measured by an instrument having a graduated scale between two fixed points, known as the thermometer. Temperature as a feature of weather or climate is principally governed by the angle at which the sun's rays strike the earth; the more nearly vertical the rays, the higher the temperature. Bodily temperature remains normally about 98.4° (see TEMPERATURE OF THE BODY).

Related Articles. Consult the following titles for additional information:

Climate	Thermometer
Heat	Weather Bureau

TEMPERATURE OF THE BODY. The temperature of the average normal adult of good health is from 98.4° to 98.6° F. A temperature a fraction of a degree above or below these figures is not uncommon, however. In old age and at the beginning of life the temperature is a little above the average, and in case of adults there is a slight rise

during exercise and after a meal. A decided rise of temperature is a sign of disease or other bodily disturbance; usually there is doubt of recovery if the clinical thermometer shows more than 108°. In heat prostration, however, temperatures of 112° and over are not uncommon. A high temperature and rapid pulse usually coincide, there being an increase of about ten beats for each degree of temperature. See FEVER.

TEMPERING, the process of hardening metals, particularly iron and steel. Steel is tempered by being heated to a cherry red and then suddenly cooling. If cooled in water it is very hard, but also brittle. This is corrected by gradual reheating till the hardness is brought down and the toughness increased. The presence of carbon in steel increases its brittleness. Steels of high carbon or of intricate shape are likely to crack when water-quenched, and may be cooled in oil or molten lead. The excellence of razors, knives and all steel-cutting instruments depends on the degree of temper. See ANNEALING; STEEL.

TEMPLARS, KNIGHTS, a military and religious order of Knights established at Jerusalem in 1118, for the protection of pilgrims in Palestine. Subsequently its object became the defense of the Christian faith and of the Holy Sepulcher against the Saracens. The name Templars was adopted because the quarters assigned to the order were in a palace in Jerusalem, known as Solomon's Temple; nine French Knights constituted the original body. The grand master, the chief of the order, had the rank of a prince, and the order acknowledged the pope alone as its protector. Compelled, in 1291, to leave the Holy Land, the Templars transferred their chief seat to the island of Cyprus. The order was abolished in 1312 on the charge that the members had ambitious designs on European thrones and held heretical views.

Modern Knights Templars. This is one of the higher degrees in the order of Free Masonry. See MASONRY.

TEMPLE, in architecture, an edifice designed for the performance of public worship. Magnificent and wonderful temples were erected in ancient Greece, Rome and Egypt. The most remarkable temple in the world, was that built by Solomon, on Mount Moriah, in Jerusalem. It was an oblong stone building, 60 cubits in length, 20 in

width and 30 in height. The interior was divided into the most holy place, or Holy of Holies, and the sanctuary, or Holy Place. The former contained the ark of the covenant and was separated by a curtain from the sanctuary, in which were the golden candlesticks, the table of the showbread and the altar of incense.

This Temple was destroyed by Nebuchadnezzar in 586 B. C.; and after the return of the Jews from the Babylonish captivity, a second Temple, much inferior in splendor, was erected. Herod the Great rebuilt it on a larger scale, surrounding it with four courts, rising above each other like terraces, the lowest of which was 550 cubits square. In the middle of this enclosure stood the Temple, of white marble richly gilt, 100 cubits long and wide and 60 cubits high, with a porch 100 cubits wide. This magnificent edifice was totally destroyed by the Romans in A. D. 70 and on its site the Turks built a mosque, which is known as the Dome of the Rock, or Mosque of Omar.

TEMPLE, TEX., a city in Bell County, thirty-five miles southwest of Waco, on the Gulf, Colorado & Santa Fé and the Missouri, Kansas & Texas railroads. It is surrounded by some of the richest farming land in the state and has a very large trade in cotton. There are cottonseed oil mills, cotton compresses, a large candy factory, flour mills, bottling works and manufactories of agricultural implements. The city has a Federal building, a Carnegie Library, a business college, an academy and two hospitals. The place was settled in 1881. Population, 1910, 10,993; in 1920, 11,033.

TENACITY, *tenas'iti*, the measure of the resistance of bodies to tearing or crushing. Tenacity results from cohesion, or the attraction which exists between the particles of bodies; and the stronger this attraction is in any body, the greater is the tenacity of the body. Tenacity is consequently different in different materials. Wood is more tenacious than lead, and cast steel is still more so. The tenacity of wood is much greater in the direction of the length of its fibers than in the transverse direction. With regard to metals, the processes of forging and wire-drawing increase their tenacity in the longitudinal direction (see WIRE); and mixed metals have, in general, greater tenacity than those which are simple. See COHESION.

TENANT. See LEASE.

TENDER, in law, an offer of compensation or damages made in a money action. To make a tender valid, the money must be actually produced. A tender of money for any payment is called a *legal tender*, if made in current coin of the country. In the United States, if the tender is in pennies, it is not legal to offer more than twenty-five; if the tender is made in silver coins less than one dollar, the amount tendered cannot exceed ten dollars; if made in gold and silver coins, above one dollar, it may be for any amount; if made in United States bank notes, it is legal tender for any amount and for any debt, except for duties on imports and interest on the public debt.

TENDONS, the name given to the sinews, or cords, by means of which the muscles are attached to the bones. They consist of bundles of white, fibrous, inelastic and very strong tissue, arranged in bands, separated by areolar or connective tissue. Tendons are often quite long, especially where the parts are slender, those in the fingers extending from the muscle in the upper part of the forearm.

TENEMENT, according to statute, any building in which three or more families live. In popular thought, however, the term, derived from the Latin *tenementum*, meaning *holding*, is restricted to houses occupied by several different families of the poorer classes of city populations.

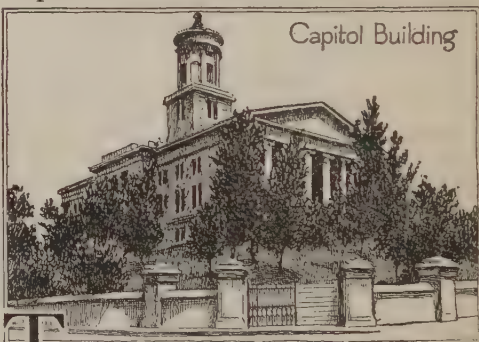
The governments of almost all large municipalities have passed tenement house laws aiming to better housing conditions and to prevent unhealthful congestion. Sociologists and legislators are attacking the problem in all its phases, and have succeeded in eliminating many evils, but there is still much to be accomplished to safeguard the health and safety of the people living in the congested districts of all large cities. To enforce the laws so far as possible, health boards, public health nurses, sanitary inspectors, building commissions and other agencies are appointed. Light and ventilation are now insisted on everywhere. A part of the building lot must be left vacant so as to provide inner courts open to the air and weather. All rooms must have windows opening on such courts or on public streets. Sanitary closets must be provided and arrangements made for a suitable degree of family privacy. Fire protection is looked after, and the height of the buildings is limited.

TENERIFFE, *ten er if'*, the largest of the Canary Islands (which see).

TENIERS, *ten'yerz*, the family name of two famous Flemish painters, father and son.

David Teniers, THE ELDER (1582-1649), was born at Antwerp and was taught his art by Rubens. He chose for treatment almost exclusively scenes from everyday life. His pictures are distinguished for their charm of detail, naturalism and color effect. The most noteworthy are *A Dutch Kitchen*, now in the Metropolitan Museum, New York, *Playing at Bowls* and *Peasants Carousing in Front of a Tavern*.

David Teniers, THE YOUNGER (1610-1690), chose the same kinds of subjects as those painted by his father, and he is recognized as one of the foremost of Flemish genre painters. He, too, was born at Antwerp, and was trained by his father. In 1650 he became court painter at Brussels, and remained there the rest of his life. He executed several hundred pictures, most of them depicting the cheerful scenes he witnessed in the homes and on the streets about him. His works are distributed among all the great galleries of Europe and America. They include *The Barber Shop*, *Peasants' Dance*, *Marriage Festival* and *A Merry Repast*.



Capitol Building

TENNESSEE, *ten eh se'*, thirty-fourth among the states of the American Union in area and seventeenth in population, lies south of Kentucky and north of Georgia, Alabama and Mississippi. North Carolina is east, and Missouri and Arkansas are west. Tennessee is popularly called the **BIG BEND STATE**, the name referring to the majestic sweep of the Tennessee River, which lacks but little of flowing twice across the state. The area is 42,022 square miles, of which 335 square miles are water. The population in 1910 was 2,184,789; by Federal cen-

sus this had increased to 2,337,459 in 1920, a gain of 7 per cent.

Surface and Drainage. What is known as East Tennessee extends from the Smoky Mountains to the crest of the Cumberland Plateau, and contains some of the largest ridges of the Appalachians. Between the eastern ridges and the plateau stretches a valley region about one hundred miles in width, broken by minor elevations and depressions. West Tennessee lies between the Tennessee and Mississippi rivers. The narrow valley of the Tennessee River is skirted on the west by a gravelly ridge running north and south. From this divide a rolling plain slopes toward the west, terminating in steep bluffs, beyond which are the alluvial bottom lands of the Mississippi River. Middle Tennessee is the portion of the state between the crest of the Cumberland Plateau and the Tennessee River. Its chief structural features are a fertile central basin and a sandy, gravelly highland rim surrounding it.

The state is well drained by three great river systems. The Tennessee, formed by the confluence of the French Broad and the Holston, receives the Clinch, the Little Tennessee, the Elk and the Duck. The Cumberland flows into Tennessee from Kentucky, descends southward around Nashville, passes back into Kentucky and flows into the Ohio. The Mississippi River, which forms the western boundary of the state, has several important tributaries in Tennessee.

Climate. The climate is mild and usually delightful, warm in the lowlands of the west and cooler in the highlands of the east. The average temperature for the year at Memphis is 61.3°; at Nashville, 59.3°; at Knoxville, 57.4°. The average annual rainfall is fifty-four inches, and it is well distributed throughout the state.

Mineral Resources. The mineral resources are varied and rich. The coal field coincides in extent with the Cumberland Plateau. The annual output of coal is now about 4,000,000 tons, production being stimulated by war demands in 1917. Iron ore is next in importance, Tennessee being the seventh state in the Union in the production of iron; the quantity mined increased to nearly half a million tons a year under heavy war demands. Phosphate rock of value abounds in the western portion of the central basin and in the northern and western parts of the highland rim. The marbles of East Tennes-

see are noted for their purity and variety. The copper mines produce about 14,500,000 pounds a year, and large quantities of sulphuric acid are produced as a by-product. There is some gold, silver, lead and zinc, with a combined value of nearly \$11,000,000 per year. Other minerals are slate, limestone, sandstone, lithographic stone, zinc and brick and pottery clays.

Agriculture. Agriculture is the most important industry; four-fifths of the land being in farms, and nearly half of all the area being improved land. The Mississippi bottoms are unsurpassed in fertility. They produce cotton, Indian corn, alfalfa and other crops in abundance. The most important crops of the state are corn, wheat and cotton. By far the largest acreage is in corn, four times as many acres being devoted to it as are given to hay, the next largest crop. The corn is worth, at normal prices, about \$60,000,000 a year; hay, over \$20,000,000. Cotton is worth over \$17,000,000 a year; wheat, about \$10,000,000 normally. Other products are tobacco, oats, potatoes, sorghum, peanuts and garden vegetables. Pears, peaches, apples and strawberries are extensively cultivated. Trucking for the Northern markets is an important industry in some portions of West Tennessee. Livestock raising and dairying are important.

Manufactures. The manufactures are extensive and are rapidly increasing, and Tennessee is twenty-sixth among the states in the value of its manufactured products. Nashville is the principal center of flour milling. Lumbering is an important industry in all parts of the state, and furniture, agricultural implements and other articles of wood are manufactured. Some of the largest hard-wood cabinet factories in the United States are located at Knoxville. There are many large factories for iron and steel products. Other manufactures are tobacco, cotton and woolen goods, cottonseed oil and cake, leather and leather goods, clothing, wagons, carriages and plows.

Transportation. Tennessee has a railway mileage exceeding 4,300. The principal roads are the Nashville, Chattanooga & Saint Louis, the Louisville & Nashville, the Southern, the Tennessee Central and the Illinois Central. The Cumberland, Tennessee and Mississippi are navigable rivers, the last furnishing communication with the entire Mississippi valley.

TENNESSEE

THE BIG BEND STATE

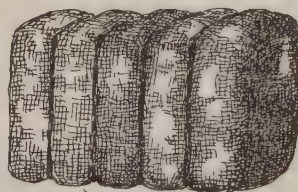


Key to Population

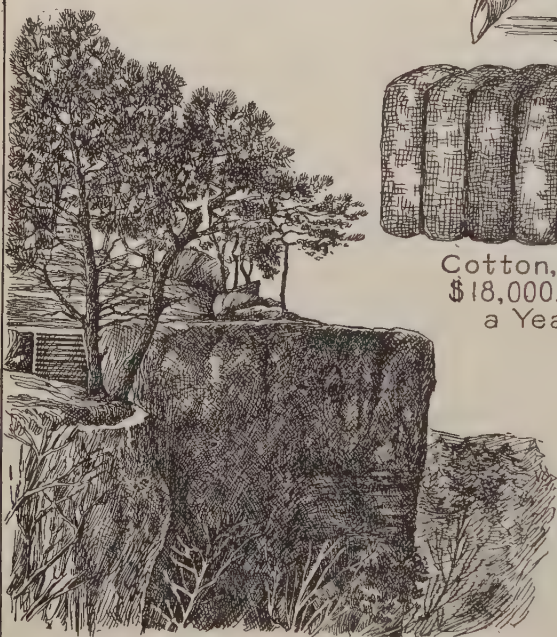
- ★ Between 115,000 and 175,000
- ▲ Between 50,000 and 100,000
- Between 10,000 and 25,000
- ◆ Between 8,000 and 10,000



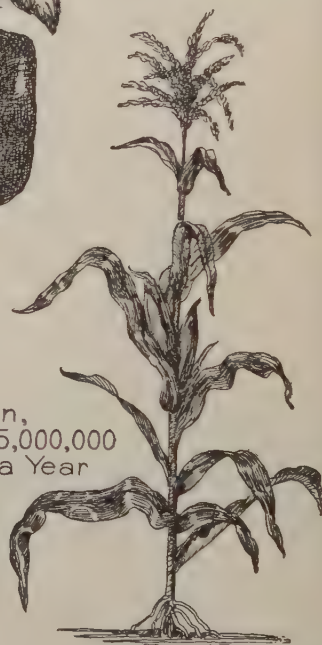
Tobacco,
\$5,000,000 a Year



Cotton,
\$18,000,000
a Year



The Leap,
Lookout Mountain



Corn,
\$55,000,000
a Year

Cities. There were six cities in the state with populations exceeding 10,000 in 1920. These were Memphis (162,351); Nashville, the capital (118,342); Chattanooga (57,895); Knoxville (77,818); Jackson (18,860); Johnson City (12,442). Memphis is fortieth among United States cities in population.

Education. The public schools are maintained by the interest on the permanent

school fund, appropriations from the state treasury and taxes levied in the counties. Many cities and towns supplement these funds by local taxation. The state appropriates to public education about one-fourth of its annual revenues. This is apportioned to the elementary schools, county high schools, the four state normal schools, the state university, and to school libraries.

White and colored children attend separate schools. The state normal schools are at Johnson City, Murfreesboro, Memphis and Nashville; the latter is an agricultural and industrial normal. Tennessee is favored with numerous universities and colleges of high rank. At the head of the system of schools is the University of Tennessee at Knoxville. Other schools of importance are the following; they are coeducational, except as otherwise noted:

Burritt College, Spencer.

Carson and Newman College, Jefferson City.
Christian Brothers College (Catholic, for men), Memphis.

Cumberland University, Lebanon.

Howard College for Young Ladies, Gallatin.
King College (for men), Bristol.

Lincoln Memorial University, Cumberland Gap.

Maryville College, Maryville.

Memphis Conference Female Institute, Jackson.

Milligan College, Milligan.

Southwestern Presbyterian University (for men), Clarksville.

Sullins College (for women), Bristol.

Synodical College for Females, Rogersville.

Tennessee College (for women), Murfreesboro.

University of Chattanooga, Chattanooga.

University of the South (for men), at Sewanee.

Vanderbilt University, Nashville.

Ward-Belmont College for Young Women, Nashville.

There are three schools of college grade for negroes. These are Fisk University at Nashville, Knoxville College at Knoxville, and Walden University at Nashville.

Institutions. The school for the deaf and dumb is at Knoxville; the school for the blind and the state reformatory are at Nashville. The hospitals for the insane are at Bolivar, Nashville and Knoxville. The penitentiary, at Nashville, has a branch at Petros. A school for the blind is at Nashville, and the state supports a Confederate Soldiers' Home, on "The Hermitage," formerly the home of Andrew Jackson, near Nashville.

Government. The legislature consists of a senate and a house of representatives. The number of representatives cannot exceed ninety-nine and the number of senators is limited to one-third the number of representatives. Clergymen are not eligible to membership. The members of both houses are elected for two years. The legislature meets biennially; regular sessions are limited to seventy-five days and special sessions to twenty days. The executive department con-

sists of a governor, elected by the people for two years; a secretary of state, elected by the legislature for four years, a treasurer and a comptroller of the treasury, elected by the legislature for two years, and an attorney-general appointed by the judges of the supreme court for eight years. The superintendent of public instruction and the commissioner of agriculture are appointed by the governor and confirmed by the senate for a term of two years. The courts consist of a supreme court, with five judges, one of whom is chief justice; a court of civil appeals, with five judges, all elected by the people for eight years, and circuit, chancery and other inferior courts, the judges of which are elected by the people of their districts for eight years.

History. Probably the first white man to visit Tennessee was DeSoto. Later LaSalle built a fort at the site of Memphis. During the eighteenth century English explorers from the eastern colonies ventured into the region, among them Daniel Boone, James Robertson and others, and established posts for trade with the Indians. In 1772 the Wautauga Association was formed, under which the territory was governed almost independently for several years. It was, however, annexed to the State of North Carolina in 1776. Indian troubles were frequent, and the fact that the government of North Carolina did not take active measures to end these outbreaks, together with the indignation aroused at the presumption of North Carolina in ceding the territory of Tennessee to the Federal government, without consulting the inhabitants, led to the formation of a state known as "Frankland" or "Franklin," with John Sevier as governor. However, North Carolina soon regained possession. After 1790 the territory was known as the "Territory South of the Ohio," until June 1, 1796, when it was admitted as the sixteenth state.

The progress of the new state was rapid, thousands of immigrants entering from all the Eastern states. The sentiment of the people of Tennessee was divided at the outbreak of the Civil War, but after a period of hesitation the state seceded in June, 1861. It furnished more than 100,000 soldiers to the Confederate army and about 30,000 to the Federal army, and it was the scene of some of the severest fighting of the war. Andrew Johnson, a War Democrat, was appointed

Items of Interest on Tennessee

The Valley of East Tennessee, which is a part of the great Appalachian Valley, consists of parallel ridges and valleys developed by erosion on shale, sandstone, and limestone; in the north-east the ridges are more numerous and higher than in the southwest.

Reelfoot Lake, eighteen miles long and three miles wide, in the northwestern part of the state, is its only large lake; it occupies a depression formed during an earthquake in 1811.

The average number of clear, fair, or only partly cloudy days during the year is 260.

The warm, moisture-bearing winds blow low from the south or southwest with a free sweep across the state; the average velocity is low, and violent storms are rare.

The character of the soil varies greatly; in general the valleys and lowlands are exceedingly fertile.

The average size of farms in the state is 81.5 acres.

On account of the scarcity of coin and paper money in the state before Tennessee was admitted to the Union, more than twenty articles were valued and declared legal tender; among them were fox skins, beaver skins, bacon, and rye whisky.

Questions on Tennessee

What is the average elevation of the state? Name some of the highest peaks.

What is the average size of the farms?

What percentage of the farm area is worked by owners?

How many miles of railroad has the state?

To what extent is the employment of women and children in factories regulated?

Name five important educational institutions.

What is the purpose of Lincoln Memorial University?

What is the state capital? What President lived near that city? Why is it important in industry and commerce?

military governor and attempted to reorganize the state as a part of the Union, but met with rebuffs from Congress. For a time after the war there was much disorder, but soon Tennessee entered upon another period of progress, which has not been interrupted. Before the advent of national prohibition a drastic prohibition law became effective. The state's finances are controlled on the budget system (see BUDGET), and there is a compulsory system of primary elections. Women were granted Presidential suffrage in 1919.

Related Articles. Consult the following titles for additional information:

CITIES

Bristol	Johnson City	Memphis
Chattanooga	Knoxville	Nashville
Jackson		

HISTORY

Chattanooga, Battle of	Frankland
Fort Henry and Fort	Murfreesboro, Battle of
Donelson	Shiloh, Battle of

RIVERS AND MOUNTAINS

Cumberland Mountains	Mississippi River
Cumberland River	Tennessee River

TENNESSEE, UNIVERSITY OF, a state university located at Knoxville. It was established in 1794 as Blount College. In 1807 the name was changed to East Tennessee College, and two years later to East Tennessee University. The present name was adopted in 1879. In 1909 the institution was recognized as an integral part of the public school system of the state. It contains the state college of agriculture and mechanic arts, and receives for the support of this college all the Federal funds allotted to the state for this purpose. It also has the Tennessee Experiment Station, supported by Federal and State funds. It maintains a branch station at Jackson, carries on co-operative agricultural experiments in Middle Tennessee, and conducts short courses in agriculture at a number of places in all sections of the state. There are colleges of liberal arts, commerce, law, medicine and dentistry, the summer school and the graduate school. The colleges of medicine and dentistry are at Memphis. The student enrollment is over 2,000 and the faculty numbers more than 200. There is a library of 42,600 volumes.

TENNESSEE RIVER, the largest tributary of the Ohio River, formed by the Clinch and the Holston, which rise in Virginia and unite in the eastern part of Tennessee. It flows southwestward to Chattanooga, crossing the Alleghany Mountains, thence flows westward through the northern part of Alabama, then northward and northeastward and again northwestward, crossing Ken-

tucky and joining the Ohio near Paducah. It is about 800 miles long—1,200 miles, with the Holston. It is navigable for large steamboats to Florence, Ala., where it is obstructed by shoals. A canal around these has extended the navigation for steamers as far as Kingston.

TENNIEL, *ten neel'*, JOHN, Sir (1820-1914), one of the most famous illustrators, born in London. He painted one of the frescoes in the Houses of Parliament in 1845, but he painted only a few pictures. From 1851 to 1901 he was connected, as an illustrator, with *Punch*, and produced over two thousand cartoons for that paper, in particular the weekly political cartoon. He also illustrated many Christmas and other books, including *Aesop's Fables*, *Ingoldsby Legends* and *Alice's Adventures in Wonderland*.

TENNIS, a game played on an oblong walled court (not to be confused with *lawn tennis*). Two players, using balls and rackets similar to those of lawn tennis, keep the ball bounding against a wall, striking it alternately, the object being to keep it going as long as possible. The game was introduced into England in the thirteenth century, and it continued to be very popular with the nobility to the reign of Charles II. See **LAWN TENNIS**.

TENNYSON, ALFRED, first Baron Tennyson (1809-1892), the greatest representative poet of the Victorian Age, born at Somersby, Lincolnshire, Aug. 6, 1809. With the exception of four years spent at the Louth Grammar School, his early education and preparation for college were directed by his father, rector of the parish. In 1828 he entered Trinity College, Cambridge, where he distinguished himself as a student, and where, in 1830, he won a medal, with his prize poem, *Timbuctoo*. He had published, in 1827, in conjunction with his brother Charles, *Poems by Two Brothers*, but this work gave little indication of his peculiar genius; and his first really important



ALFRED TENNYSON

work was a volume of *Poems, Chiefly Lyrical*, which appeared in 1830, and which revealed undoubted genius. In this very productive period, two years later, a second volume appeared, which won for its author recognition as a true poet. It contained many of his most beautiful shorter poems, *The Lady of Shalott*, *Oenone*, *The Lotus-Eaters* and *A Dream of Fair Women*.

Partly because of adverse criticism, but chiefly because of his deep affliction in the death of his friend, Arthur Hallam, the next nine years of his life were spent in retirement and in complete devotion to his art. As a result of these years of study, brooding and reflection, came the two volumes of 1842, which showed, in such notable poems as *Morte d'Arthur*, *Dora*, *Locksley Hall*, *Ulysses*, *The Two Voices* and *Break, Break, Break*, that the poet's power was reaching its maturity. From this year dates Tennyson's supremacy. *The Princess*, with its exquisite lyrics, was published in 1847, and following this in 1850 came *In Memoriam*, in some respects the finest elegiac poem in the language. The suffering and doubt and final triumph of faith, which had been Tennyson's personal experience after the death of Arthur Hallam, and the general tendency of the age to skepticism and materialism, which must finally emerge in a deeper and nobler faith and understanding, find expression in this series of lyrics. In this same year Tennyson succeeded Wordsworth as poet-laureate; and he married Miss Emily Sellwood, to whom he had been for years betrothed.

Maud, and *Other Poems* was published in 1855, but was not received with marked enthusiasm. This coldness, however, was more than compensated by the revival of popularity in 1859, when the *Idylls of the King* appeared. In 1864 came *Enoch Arden*, perhaps the most popular of Tennyson's poems. During his later years he made several attempts at dramatic composition, but, though his productions are excellent, they cannot rank with the best. In 1889 appeared the volume called *Demeter and Other Poems*, which contained *Crossing the Bar*.

In 1884 he was made a baron. During his remaining years he lived in the retirement he had always chosen, and his life was ended fittingly by a quiet death in his summer home at Alderworth, Sussex, Oct. 6, 1892. He was placed in Westminster Abbey, next to Chaucer and Robert Browning.

Tennyson's marvelous mastery of the form of verse, his keen sensibility to both material and spiritual beauty and his sympathy with the dominant longing of his age for truth, make him at once its truest and greatest exponent and one of the rarest of the world's poets. Consult Stopford Brooke's *Tennyson, His Art and Relation to Modern Life*.

See the article Reading, for additional material relating to Tennyson.

TENT. See CAMPS AND CAMPING.

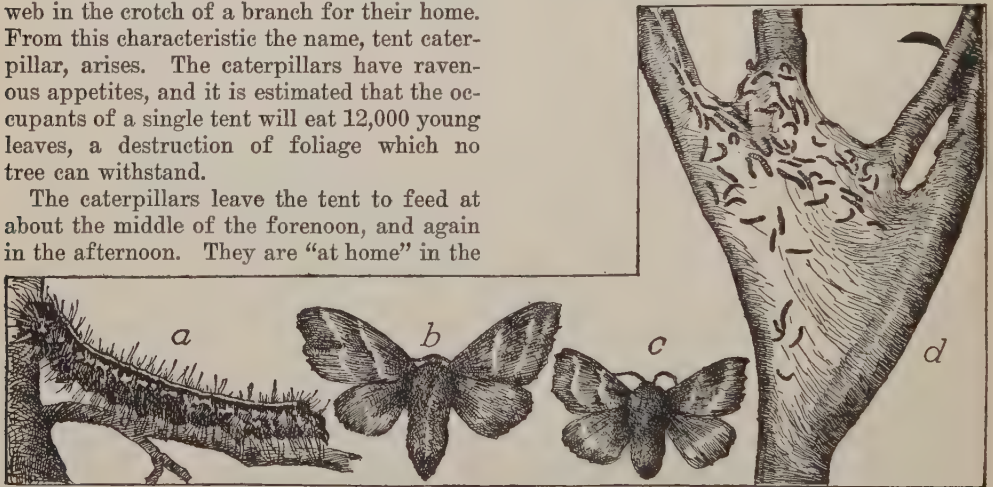
TENT CATERPILLAR, *kat'er pil ar*, the caterpillars or larvae of four species of silk-spinning moths. The apple-tree tent caterpillar is the most destructive and the best known. The female is a dull reddish-brown moth, with two oblique pale stripes on the fore wings. In July the eggs, about 300 in number, are laid in rings or belts around the small twigs on apple and wild cherry trees. The eggs are firmly cemented together and remain on the twig until the following spring, when the young appear and spin a tentlike web in the crotch of a branch for their home. From this characteristic the name, tent caterpillar, arises. The caterpillars have ravenous appetites, and it is estimated that the occupants of a single tent will eat 12,000 young leaves, a destruction of foliage which no tree can withstand.

The caterpillars leave the tent to feed at about the middle of the forenoon, and again in the afternoon. They are "at home" in the

ent silk, in which they change. Within twenty or twenty-five days the moths issue from the cocoons and soon after lay their eggs for next year's brood.

The forest tent caterpillar, or forest army worm, is common in the eastern part of the United States, and there are two varieties on the Pacific coast, the California tent caterpillar, which is found on oak trees in the spring, and another variety that attacks fruit trees.

TENURE OF OFFICE ACT, an act passed by the Congress of the United States in 1867 limiting the President's power to remove officers appointed by him. According to the Constitution, the consent of the Senate is not required. Until the date named it had been the prerogative of every President to dismiss any official who had come into office by Presidential appointment. Soon after Andrew Johnson was inaugurated he came into conflict with Congress on the question of reconstruction. Fearing that the



TENT CATERPILLAR

(a) Full grown caterpillar. (b) Female moth. (c) Male moth. (d) Tent caterpillar.

early morning and in the evening, and by burning the tents or spraying them with kerosene at these times most of the caterpillars can be destroyed. The eggs are easily seen, and may be removed from the trees and destroyed during the winter. Many eggs are eaten by birds that remain in the locality during the winter. The caterpillars reach their full growth in about forty days, after which they leave their nest to find sheltered places under leaves, fence rails, etc., and spin a spindle-shaped cocoon of almost transpar-

President might exercise the unlimited power of removal allowed him by the Constitution and thus interfere with the Congressional policy of reconstruction, Congress passed the Tenure of Office Act, which made all removals impossible without the consent of the Senate. Johnson, taking the stand that the act was unconstitutional, ignored it, and in his attempt to remove Edwin M. Stanton, Secretary of War, brought about his own impeachment. In 1887 the act was repealed. See CIVIL SERVICE.

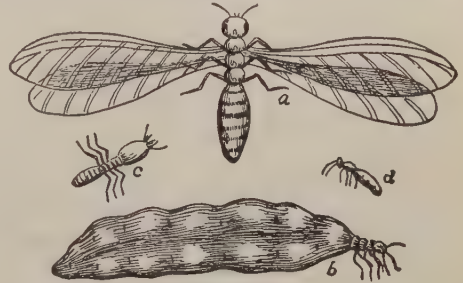
TERCEIRA, *ter'se'ra*. See AZORES.

TERENCE, *ter'ens*, (about 185-159 B. C.), in full, Publius Terentius Afer, a celebrated Roman writer of comedies. He was born in Africa, and while a child was bought by Publius Terentius Lucanus, a Roman senator, who took him to Rome, gave him a good education and finally freed him. The first play which he produced, *Andria*, won him recognition and popularity. About the year 161 he went to Greece, where he translated many of Menander's comedies. According to some accounts he died in Greece; according to others he was drowned in his passage back to Italy. Six comedies of Terence's are extant, and these are all he is known to have produced: *Andria*, *The Eunuch*, *The Self Tormentor*, *Phormio*, *The Stepmother*, and *the Adelphi*, his last piece, brought out in Rome the year before his death.

TERHUNE, *ter'hune'*, MARY VIRGINIA HAWES (1831-1922), an American writer, best known by her pen name of MARION HARLAND. From the time she was fourteen years old she wrote for the press. In 1888 she became editor of *The Homemaker*. She has conducted departments in *Wide Awake*, *Saint Nicholas* and many other periodicals and in daily newspapers. Among the novels which she has published are *The Hidden Path*, *Miriam*, *Judith*, *True as Steel* and *Moss-Side*.

TERMITES, *tur'mites*, a family of insects, commonly known as white ants. They live

much like the ants, though really they have little relationship to them. Termites are confined to the tropics and are especially plentiful in western Africa. They live in colonies, raising large dwellings, in the form of irregular pyramids or cones, to the height of ten or twelve feet. These structures are firmly cemented and are strong enough to bear the weight of several men. Each is divided into various apartments, chambers and galleries, which have their specific uses, like the rooms

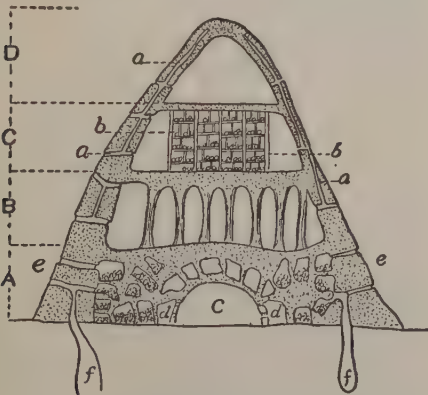


TERMITES

a, perfect male; b, female distended with eggs; c, soldier; d, worker.

of a house. In every colony there are a king and a queen, both of which are much larger than the rest of the insects; they are constantly kept together in a large chamber in the heart of the hive, where they are attended by a detachment of workers. The queen lays the eggs at intervals, and workers carry them off to the small cells in which the larvae are reared. As in the case of the bees, the king and queen make a nuptial flight, after which the wings break off. The other members of the colony are wingless except at certain seasons of the year, when a brood with wings is reared and sent away to found a new colony. There seem to be two classes of neuters, the workers and the soldiers. It is the duty of the former to build the habitations, make covered roads, nurse the young, attend the king and queen and manage the domestic affairs of the colony. The soldiers have powerfully developed mandibles, and they defend the community with desperate courage from any attacks. In the tropics, some species are terribly destructive, as they sometimes riddle all the timbers of a house before their presence is even known. One species of termites is native of the United States.

TERN, *turn*, a group of birds related to the gulls, found along lakes and rivers and on the seacoast in every part of the world. They are remarkable for their power of flight. The



TERMITE'S NEST

In the above diagrammatic section of a termite's nest, D, represents a well-aired empty attic, C, the next story, the nursery, where the young termites are hatched; B, a hall, supported by pillars; A, the ground story; a, winding passages in the walls; b, the shelves on which the young termites are hatched; c, the royal chamber, in which the king and queen are imprisoned; d, the chambers of the worker termites; e, store chambers; f, holes in the ground out of which the material used in making the nest is dug.

wings are very long and pointed, the tails forked. The largest of about fifty species, the *Caspian* tern, has a wing expanse of about four feet. The smallest is the *least* tern, which is a little more than eight inches long. One of the most beautiful is the *common* tern, seen occasionally on the Atlantic coast. It has pearl-gray plumage, a white throat and tail, and is about fourteen inches long. The terns nest in colonies, usually on uninhabited rocky islands. They lay the eggs upon a rough nest of sticks or upon the bare rocks. There are about ten species in North America, among which are the *gull-billed*, *sooty*, *black* and *royal*.

TERPSICHORE, *terp sik'o re*, in Greek mythology, one of the nine Muses, the originator and patroness of the dance. She is represented as a laurel-crowned virgin holding in her hand a lyre. See **MUSES**.

TERRA COTTA, from an Italian word meaning *baked earth*, is baked clay or burned earth, a similar material to that from which pottery is made, much used, both in ancient and modern times, for architectural decorations, statues, figures and vases. As now made, it usually consists of potter's clay and fine powered silica. It is produced in many different colors, the most pleasing being a rich red and a warm cream color. Large numbers of ancient statues, especially statuettes, of terra cotta have been found in recent times. Terra cotta is extensively used by architects for ornamenting buildings.

A large part of terra cotta work is made in plaster of Paris molds. Cornices and other architectural decorations, in which many pieces are just alike, can best be divided into numerous sections and cast. In the process of firing, terra cotta shrinks about one inch to the foot, and allowance must be made for this in the molding. Terra cotta may be glazed or enameled beautifully in white and colors, the work being done exactly as in the case of tile glazing. See **POTTERY**.

TERRAPIN, the popular name of several species of turtles. They are covered with a slightly-curved, circular shell, and are able to draw legs, head and tail under this horny plate. They inhabit ponds, swamps and rivers, in tropical and temperate regions, and feed on vegetable food, fish, small reptiles and other animals. Terrapins are more agile on land than many other turtles, and they are good swimmers. In the United States the name is applied most frequently to the dia-

mond-back terrapin, a salt-marsh denizen whose flesh is considered a great table delicacy. It is common in the marshes along the South Atlantic coast. In some sections terrapins are reared in enclosures for the market.

TERRE HAUTE, *ter e hote'*, IND., county seat of Vigo County, seventy-two miles southwest of Indianapolis, on the Wabash River and on the New York Central, the Pennsylvania, the Chicago & Eastern Illinois, the Evansville & Indianapolis, the Evansville & Terre Haute, and the Chicago, Terre Haute & Southeastern railroads and several electric lines. The city is located on the high terraces of the Wabash River, is regularly laid out, with broad streets, and has several parks. It is the seat of the Rose Polytechnic Institute, the Indiana State Normal School and Saint Mary's Institute, and it has several orphanages, hospitals and the Rose Dispensary. The public library, the Federal building, the courthouse, the city hall, the opera house and the union station are some of the most prominent structures. The surrounding country is agricultural and contains valuable coal mines. Industrial establishments include glass plants, foundries, machine shops, flour and hominy mills, clothing factories, rolling mills, packing houses, car works, planing mills and manufactories of carriages, electric motors, enameled ware, paving brick, stoves and tools. The place was founded in 1816, and was chartered as a city in 1833. Population, 1910, 58,157; in 1920, 65,914.

TERRIER, a small dog, remarkable for the eagerness and courage with which it goes into holes in the earth to attack foxes, badgers, cats, rats and the like. The name is taken from the Latin *terra*, meaning *earth*, and refers to the terrier's method of hunting. There are about fifteen varieties. In Great Britain two kinds are common; these are the *Scotch terrier*, rough and wire-haired, and the *English terrier*, smooth-haired and generally more delicate in appearance. The *Skye terrier*, a sub-variety of the Scotch terrier, is much prized. The *pepper* and *mustard* breeds, rendered famous by Sir Walter Scott, are also highly valued. The *black and tan* terrier has a sleek and soft coat. All terriers are vigorous and intelligent and have very keen senses. Few other breeds of dogs are greater favorites.

Related Articles. Consult the following titles for additional information:

Dog			
Fox Terrier	Scotch Terrier	Skye Terrier	

TERRITORY, a term applied in the United States to an area similar to a state of the Union, but without the independent position of a state, governed directly by Congress, through a governor and other chief officials, appointed by the President, and a legislature of certain limited powers. Territories are usually admitted as states on attaining a sufficient population and adopting a constitution approved by congress. There are no territories remaining in the continental United States, but Alaska, Hawaii, the Philippine Islands and Porto Rico are yet governed as territories.

TERROR, REIGN OF, the term usually applied to the period of the French Revolution from the appointment of the Revolutionary Tribunal and the Committee of Public Safety, in April, 1793, to the fall of Robespierre in July, 1794. See FRENCH REVOLUTION.

TERRY, ELLEN ALICIA (1848-), a famous English actress, born at Coventry. She made her first appearance on the stage when only eight years old, playing Manilius in Shakespeare's *Winter's Tale* at the Princess's Theater, under the management of Charles Kean. In 1858 she acted the part of Arthur in *King John*, and in 1863 she made her début as a regular performer, playing Gertrude in *The Little Treasure* at the Haymarket. She married Watts, the painter, in 1864 and left the stage. She was the model for his



ELLEN TERRY

great painting, Sir Galahad. In 1867 she was divorced, and again entered upon a stage career, reappearing at the New Queen's Theater, London. In 1879 she made her first appearance at the Lyceum, and for almost a quarter of a century she assisted Henry Irving in his presentation of many of the greatest of classic and modern plays. In Tennyson's *The Cup*, in *Romeo and Juliet*, *Faust*, *Eugene Aram* and *Becket*, she proved her right to rank with the greatest of English actresses, but it was as Portia, in the *Merchant of Venice*, that her strongest work was done. In company with Irving she made many visits to America and always met with great success.

TERTIARY, *tur'she a ri*, **PERIOD**, a term formerly employed in geology to designate the first division of the Cenozoic Era. The rocks formed in this period constitute the tertiary system. At one time it was thought that each stratum of rock contained three distinct formations, primary, secondary and tertiary. The English geologist Lyell divided the tertiary system into four epochs—Eocene, Oligocene, Miocene and Pliocene. The United States Geological Survey has grouped these epochs into two, Eocene and Neocene, and this classification is generally adopted in the United States. The term *tertiary* is now little used. See CENOZOIC ERA; GEOLOGY.

TERTULLIAN, one of the foremost of the early Christian fathers, the first of the great Latin writers of the Church. He was born at Carthage, North Africa, of heathen parentage, in the latter part of the second century, and was educated for the law. In his early manhood he went to Rome and was converted to Christianity. He returned to Carthage, where he became a presbyter; but moral laxity in the Church caused him to withdraw, and he thenceforth lived a life of extreme severity. His writings reveal intensity of character, moral strength, keen satire and earnestness. Chief of these is the *Apology*, a vindication of the Church against its heathen detractors.

TESLA, NIKOLA (1857-), a famous electrician, born at Smiljan, Croatia. He was educated at the Polytechnic School at Gratz and at the University of Prague, and worked for the Austrian government until 1881. In 1884 he emigrated to America, was naturalized and became associated with Thomas A. Edison. Subsequently, for purposes of research, he opened laboratories of his own in New York City and made numerous practical inventions. To him is due credit for the discovery of the rotary magnetic field and its practical application to the induction motor; for substituting the alternating current for the direct current; for many improvements in dynamos, arc lamps, incandescent lights, induction coils and condensers.

TEST ACTS, the general term applied to various acts of the English Parliament, which made the holding of public offices conditional on certain religious tests. The name especially belongs to the Corporation Act of 1661, which decreed that all magistrates must take the oaths of allegiance and supremacy and must receive the communion according to the

Church of England; and to the Test Act of 1673, which imposed the same tests on the holders of all public offices. These statutes, after various modifications, were finally repealed in 1829.

TETANUS, the disease commonly known as *lockjaw*. In warm climates this is a frequent result of wounds, and it consists in spasmodic contraction of the muscles. This is often strong enough to draw the body entirely out of shape and to hold the lower jaw so closely against the upper that it is impossible to separate them. The disease is a terrible one and is usually fatal, as not more than ten per cent of well-developed cases recover. The disease is infectious and is caused by the presence in the wound of a bacterium common in dirt or the soil of gardens. Treatment by serum is the only cure. See **SERUM THERAPY**.

TETRAZZINI, *tet ra tse'ne*, LUISA (1874-), a famous Italian soprano, born at Florence. She learned many operas before the age of twelve, by listening to the singing of her sister, and so wonderful was her early ability that she was given an excellent musical education. Her first public appearance was in her native city in 1895. Afterwards, she sang in grand opera and concert in the principal cities of the world, and gained wonderful popularity, ranking with the greatest singers of her time. Her favorite operas were *Lucia di Lammermoor* and *La Sonnambula*.

TETZEL, JOHANN (1460-1519), the chief opponent of Martin Luther at the beginning of the Reformation (which see), was a German monk of the Dominican Order. He was born in Saxony and was educated at the University of Leipzig. He joined the Dominicans soon after his graduation. He was an eloquent and forceful preacher and was entrusted with the proclamation of an indulgence on behalf of the Teutonic Knights from 1503 to 1510. Again in 1516 he was given a similar mission for the purpose of raising money to complete Saint Peter's Church in Rome. It was in connection with this mission that Tetzel aroused the opposition of Luther, whose famous ninety-five theses were directed against Tetzel and his methods. Tetzel's published reply contained language which the Church considered extravagant and intemperate, and he was summoned to appear before the Papal legate, by whom he was severely reprimanded.

TEUTONIC KNIGHTS, *tu ton'ik nites*, a religious and military order, founded in 1190 by a group of German merchants for the purpose of relieving the sufferings of the Crusaders at Acre, in Palestine. Like the Knights Templars and Knights Hospitalers, which sprang up at about the same time, it originally was an organization of noblemen and knights, but later its membership included priests and lay brothers. After their conquests in Palestine the Teutonic Knights, in 1225, began a crusade of Prussia, which was largely pagan, and from 1283 to 1466 they held sway there. After this the order declined rapidly, though a few loyal knights continued its existence until 1809, when it was dissolved by Napoleon and its properties in all countries were confiscated. The emperor of Austria reorganized the Teutonic Knights in 1840 as an Austrian imperial order, for service such as that performed by the Red Cross Society.

TEUTONIC RACES, a term now applied to the High Germans, including the German inhabitants of Upper and Middle Germany and those of Switzerland and Austria; the Low German, including the Frisians, the Plattdeutsch, the Dutch, the Flemings, and the English descended from the Saxons, Angles and other tribes who settled in Britain; the Scandinavians, including the Norwegians, the Swedes, the Danes and the Icelanders.

TEXARKANA, ARK. and TEX., adjoining cities on the boundary line, one the county seat of Miller County, Ark., and the other in Bowie County, Tex. They are 145 miles southwest of Little Rock, Ark., on the Texas & Pacific, the Kansas City Southern, the Saint Louis Southwestern and the Saint Louis, Iron Mountain & Southern railroads. The towns have separate city governments, but form a single industrial community. A postoffice, situated on the state line, is used by both cities. There are many fine residences and good business blocks, a Y. M. C. A. building, a railroad hospital and more than thirty churches. The educational institutions are the Saint Agnes Academy, the Saint Rose of Lima Academy and the Texarkana Industrial College. The place has a large trade in lumber, cotton and hides. The leading industrial establishments are cotton works, railroad shops, lumber mills, machine shops and furniture and pottery factories. Both towns were settled in 1873 and became incorporated cities in 1887. Population, in Arkansas,

TEXAS

THE LONE STAR STATE

HISTORY
EXPLORED 1528
SETTLED 1685
INDEPENDENT 1836
MADE STATE 1845

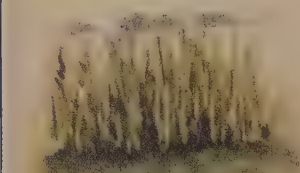
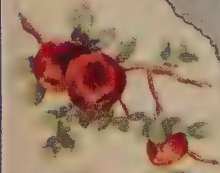
GEOGRAPHY

AREA 265,780 SQUARE MILES
EQUAL TO 33 OF MASSACHUSETTS
LENGTH EAST TO WEST 740 MILES
LENGTH NORTH TO SOUTH 760 MILES

RANK IN THE UNION

FIRST IN THE PRODUCTION OF COTTON & LIVESTOCK
SECOND IN THE PRODUCTION OF SUGAR AND RICE

INDUSTRIES
STOCKRAISING, AGRICULTURE
HORTICULTURE
PRODUCTION OF PETROLEUM



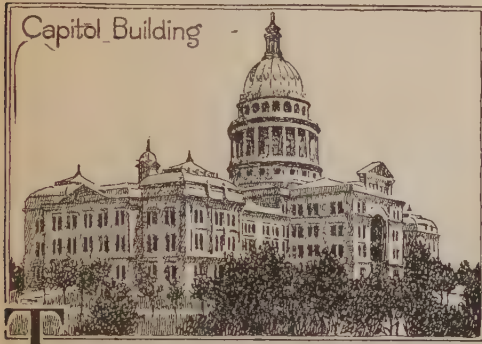
1. Rice.
2. Cattle and Swine.
3. Sheep.
4. Apples

5. Grapes.
6. Pears.
7. Strawberries
8. Peaches.

9. Rice Field.
10. Sugar Cane.
11. Cotton Field.
12. Vegetables

13. Oil Well.
14. Corn.
15. Draft Horses
16. Oats.

1910, 5,559; in 1920, 8,257 (Federal census); in Texas, 1910, 9,886; in 1920, 11,480 (Federal census). Combined population, 1910, 15,445; in 1920, 19,737 (Federal census), a gain of over 27 per cent.



TEXAS, the largest state of the American Union, in area and natural resources worthy of being compared with many of the world's independent nations. It was, in fact, admitted into the Union when an independent republic, something that can be said of no other state. Its popular name, the *Lone Star State*, refers to its flag, which bears a single star. This was also the emblem of the republic of Texas. Its special flower is the bluebonnet.

Location and Area. Texas is one of the south-central states. Only Florida extends farther south, and a line through the exact center of the state would fall but slightly west of a line running midway between the Atlantic and Pacific oceans. Mexico and the Gulf of Mexico form the southern boundary; Louisiana and Arkansas touch the state on the east, Arkansas and Oklahoma are on the north, and New Mexico is on the west. Texas is more than one-twelfth the size of the entire United States, exclusive of Alaska and the Philippines, and is larger than either France or Germany. Among the Canadian provinces, however, it is exceeded in size by Quebec, Ontario and British Columbia. Its length from north to south is 760 miles; its breadth from east to west is 740 miles, and its gross area is 265,896 square miles, of which 3,498 square miles are water.

People. In 1920, with a population of 4,663,228, Texas ranked fifth among the states in number of inhabitants. Its density per square mile, however, was only 17.8; thirty-four states were more thickly populated. In 1910, according to Federal census, the population was 3,896,542. Texas has about

741,000 negroes and over 125,000 Mexicans, the latter constituting the largest element in the foreign-born population. Germans, Austrians and English are next in order.

The largest religious bodies are the Baptists and Methodists, followed by the Roman Catholics, Disciples of Christ, Presbyterians and Episcopalians.

Cities. Dallas and San Antonio, each with over 150,000 inhabitants (1920) are the largest cities; the next seven, in order, are Houston, Fort Worth, El Paso, Galveston, Beaumont, Waco and Austin, the capital.

Surface and Drainage. In general, the surface of Texas consists of a series of extended plains and plateaus more or less diversified by mountains and hills, and sloping gradually from the northwest to the southeast.

The state is divided into four physiographic regions. The first region, belonging to the coastal plain, extends inland from 100 to 200 miles and is prolonged northward to the northeastern corner. This region rises gradually from sea level to an altitude of 600 to 700 feet. The northern part of it is heavily timbered with long-leaved pine, short-leaved pine and hard woods. Second is the Great Black and Grand Prairie region, which lies to the west and northwest of the coastal plain. This region has an area of about 31,000 square miles and consists of a gently-undulating plain sloping toward the east and southeast, with an altitude of from 400 to 700 feet. The eastern part of this plain is nearly level, but in the west it is more broken, and that portion south of the Brazos River becomes rugged. It contains little timber, but is covered with a soil of remarkable fertility.

The third region is the great Staked Plain, or Llano Estacado, occupying the northwestern part of the state and bounded by high bluffs and buttes. This is a vast treeless plateau with an elevation of from 3,000 to 4,000 feet above sea level. It is in an arid region, but a large part of it supports a good growth of grass, and the region is well adapted to grazing. The fourth, the mountainous region, occupies the western part of the state between the Pecos and Rio Grande. This contains a continuation of the Rocky Mountains, which extend southward into Mexico. The elevations vary from 3,000 to 6,000 feet and some of the highest peaks have an elevation of 9,000 feet.

The rivers of Texas flow into the Mississippi, the Gulf of Mexico or the Rio Grande,

the latter forming the boundary between the state and Mexico. The principal tributary of the Mississippi from Texas is the Red, which forms a part of the northern boundary and drains the northeastern corner of the state. The Sabine, forming a part of the boundary between Texas and Louisiana, drains a small portion of the eastern section and flows directly into the Gulf. The other streams of importance flowing into the Gulf, in their order southward from the Sabine, are the Neches, the Trinity, the Brazos, the Colorado and the Nueces. The principal tributary of the Rio Grande is the Pecos, which flows across the western part of the state. Along the coast there are numerous lagoons enclosed by low sand bars, and in a number of places there are deep indentations, the most important of these being Sabine Lake, Galveston Bay, Matagorda Bay and Corpus Christi Bay.

Climate. On account of its size and its relief, Texas has a variety of climate. The southern extremity is only 2° from the torrid zone, but the state stretches northward through 11° of latitude. It is mostly exempt from the extremes of cold and heat. The Gulf breeze blows from the southeast during the summer. The east part of the state is humid, with an annual rainfall of fifty to sixty inches. Toward the west it gradually diminishes, and at El Paso it is about ten inches. The Gulf coast and prairie region have abundant rainfall. The mean annual temperature is about 70°. One of the climatic features of the state is what is known as the "northers," which are stormy, northwest winter winds.

Mineral Resources. The value of the minerals produced in a year is approximately \$30,000,000, but the output of the mines by no means represents maximum production. Petroleum is the most valuable source of income, though the first field was not opened until 1894. Texas is now surpassed in oil production only by Oklahoma and California, and the yearly output is over 100,000,000 barrels. This is about two-thirds the output of Oklahoma; Kansas, Louisiana and Wyoming are also developing oil fields of great productive capacity. Texas petroleum is used both for lighting and for fuel, and the state has two other important sources of fuel, namely, coal and natural gas.

In the north and east-central parts there are extensive deposits of lignite and bitum-

inous coal; another area occurs along the Rio Grande between Laredo and Eagle Pass. The coal fields are about 63,000 square miles in extent, and are producing at the rate of about 2,000,000 tons a year. Texas is estimated to have a natural gas area covering 130 square miles. Its average annual yield is 13 billion cubic feet, and in this product it ranks eighth among the states.

There are valuable deposits of clay suitable for the manufacture of brick, sewer pipe, vitrified brick and pottery; the production of cement is another profitable source of income. Texas is a leading state in the production of quicksilver and of asphalt; the latter is derived chiefly from the heavy asphaltic oils found in abundance. Natural asphalt occurs in smaller quantities. Other minerals of commercial value include salt, gypsum, gold, silver, copper, lead, zinc, iron ore and cinnabar. Among the metals silver is of chief importance. The state possesses the largest artesian-well belt in the world, and there are numerous hot springs of medicinal value.

Agriculture. Texas has a more extensive area of cultivated land than any other state, and in value of crops it sometimes ranks first, though usually third—after Iowa and Illinois. Practically every crop adapted to a warm temperate climate can be grown in its fertile soil. The production of cotton is of chief importance, and in this line of agriculture Texas holds first rank among the states, its annual crop of more than 3,000,000 bales surpassing that of all British India. It raises about one-third the entire cotton crop of the United States. Over 11,000,000 acres are planted to cotton, and about 5,000,000 to corn, the most important cereal. The corn crop varies considerably, but in favorable years the harvest has reached 100,000,000 bushels. In the production of kafir corn Texas is equaled by no other state; it follows Louisiana in the output of rice, and Louisiana and Georgia in yield of sugar cane. Large crops of wheat, oats, potatoes, sweet potatoes, hay, alfalfa, tobacco, barley and rye are also raised, and berries, nuts and fruits of excellent quality are produced. Texas raises especially fine peaches, figs and pecans. Truck gardening and the sale of nursery products are among the special branches of agriculture to which much attention is given.

It is a leading livestock state, for it has extensive plains adapted to grazing. The cattle ranches are an important source of

supply for the great packing centers of the Middle West. Horses, mules, cattle, sheep and hogs are raised in great numbers, and their total value is about \$600,000,000.

In sections of limited rainfall irrigation is an important factor in agricultural development. A Federal reclamation project serves the arid region along the upper course of the Rio Grande, and in the artesian-well belt there are several private systems using water obtained from the wells. The water of the Lower Rio Grande is also utilized. A state board of engineers manages the water resources.

Manufactures. Texas possesses great natural advantages for manufacturing in its wealth of raw material and supply of cheap fuel. The large area of the state and the heavy freight charge tend also to encourage the manufacture of articles for local use. The milling of flour, slaughtering and meat packing and the manufacture of lumber and of timber products are the leading industries. Next in importance is the making of cottonseed oil and cake, in the value of which Texas ranks first in the Union. Other industries are rice polishing, sugar refining, the making of molasses, the manufacture of clay products, cotton goods, saddles and harness, the making and repairing of railway cars and the canning of fruits and vegetables.

Transportation and Commerce. Galveston, the chief seaport, is the leading cottonshipping port in the world, and ranks next to New York and New Orleans as an export and import center. The northeastern and central parts of the state are well supplied with railways. Two trunk lines extend across the state from northeast to southwest into Mexico, and two lines cross it from east to west, reaching the Pacific coast. These are connected by numerous cross-lines and also have spurs reaching the lumber regions and the most important agricultural sections, but several of the coast counties and those in the northwestern and western parts of the state are yet without adequate railway communication. The entire mileage of the state is about 15,700, which places Texas the first state in the Union in railway mileage. There are nearly 10,000 miles of surfaced roads, and about 1,000 miles of interurban lines.

The commerce of Texas is extensive. The exports consist of cotton, lumber, oil, rice, hardware, livestock, wool, vegetables and fruits, and far exceed in value the imports,

which consist of manufactured goods and food products.

Government. The legislature consists of a senate limited to thirty-one members, and a house of representatives limited to not more than one member to each 15,000 inhabitants and not more than 150 members in the aggregate. The senators are elected for four years; the representatives, for two years. The legislature meets biennially and the session is practically limited to sixty days by the reduction of pay of the members after that time. The executive department consists of a governor, lieutenant-governor, secretary of state, adjutant-general, comptroller, treasurer, commissioner of agriculture, commissioner of insurance, state superintendent of public instruction and attorney-general.

The courts consist of a supreme court of three judges, elected for six years each, five courts of civil appeal, of three judges each, one court of criminal appeals of three judges, and sixty-three district courts of one judge each; also county courts of each county, and justice courts for precincts, towns and villages. The judges of the district courts are elected for four years; those of the county courts for two years.

Education. The state maintains an excellent system of public schools and has the largest permanent school fund in the Union. The perpetual state funds amount to about \$83,000,000, the exact value and the exact distribution varying from time to time. Separate schools are maintained for white and colored children. The school system is under the direct supervision of a board of education and a state superintendent. In each county of 3,000 school population and over there is a county superintendent of schools. In smaller counties the people may, by vote, establish this office. When there is no such officer, the county judge is ex-officio the county superintendent of schools. Besides the rural schools, cities and large towns are independent school districts and have, in many instances, excellent systems of graded schools.

State normal schools are located at Huntsville, Denton, San Marcos and Canyon City. There is also a state normal school for colored teachers at Prairie View, near Hempstead. The state university is at Austin, but its medical department is at Galveston. The agricultural and mechanical college is at College Station, near Bryan, and the college

Items of Interest on Texas

The great Galveston flood was directly responsible for the establishment of the commission form of government in American cities. Immediately following the flood, great disorder prevailed and a committee of citizens was named to exercise, temporarily, absolute control of the city's interests. This centralization of authority was so satisfactory that the commission form was made a permanent feature of Galveston's government, and rapidly spread to other cities.

The Panhandle is the projection northward between New Mexico and Oklahoma.

Guadalupe Peak, 9,000 feet high, in the central western part, is the highest elevation in the state.

Originally great herds of bison roamed over the Texas plains, and deer, bear and wolves were numerous; to-day most of the large animals have been exterminated, but there still remain many smaller ones, especially Louisiana, black and cinnamon bears, coyotes or prairie wolves, prairie dogs, jack rabbits, raccoons, squirrels, opossums, skunks, jaguars, cougars and lynxes.

Snakes of many different species, especially rattlesnakes, are found in all parts of the state.

San Antonio has as its most interesting building the historic Alamo, originally a chapel, made famous in the Texan War of Independence. San Antonio is now a great commercial and manufacturing center.

Houston is the most important railway and shipping point in the southern part of the state and has a large trade in cottonseed oil, sugar, rice and lumber; its factory products are almost exclusively made from raw materials of the surrounding region.

Dallas, the principal manufacturing center of the state, is also a shipping center for a wheat, fruit and cotton-raising district, and is the most important distributing point for agricultural machinery in the southwest; it is a live-stock market and one of the chief centers in the United States for the manufacture of saddlery and leather goods.

Galveston is important chiefly as a commercial port: it is second only to New York in the value of its exports; it is the greatest cotton-exporting city in the Union, the annual exports being over \$160,000,000. It is also famous for the introduction of the commission form of municipal government.

Fort Worth, like Galveston, Dallas and Houston, has the commission form of government. It lies in the midst of a stock-raising and farming region; among the manufactured products are packed meats, flour, beer, trunks, mattresses, woven wirebeds, furniture; there are also foundries, rolling mills and tanneries.

Austin, the state capital, is the principal trade center for central and western Texas, is an important market for live stock, cotton, grain and wool, and has extensive manufactures, including flour, cottonseed oil, leather goods, lumber and woodenware. It is the seat of the University of Texas and of many other educational and charitable institutions. It adopted the commission form of government in 1909.

Waco is the commercial center for an agricultural region and also has manufactures valued at \$3,000,000 a year.

Texas is six times as large as the state of New York.

Questions on Texas

What is the area of Texas? How does it compare with other states?

What are its physical divisions?

What is the Panhandle?

Name the principal rivers. What sections do they drain?

What wild animals are still common?

In the production of what crop does Texas lead the Union?

What are some other important crops?

How does it rank in production of cottonseed oil?

What is the railway mileage of the state?

What is the Alamo and why is it famous?

Describe briefly the Galveston or commission form of municipal government.

of industrial arts (for girls) is at Denton. There are besides these institutions a number of important colleges and secondary schools under private or church control. The most important of these are the following:

Asgard College (for women) at South Houston.

Austin College (for men) at Sherman. Baylor University at Waco.

Howard Payne College at Brownwood.

North Texas Female College at Sherman.

Polytechnic College at Fort Worth.

Saint Louis College (for men) at San Antonio.

Simmons College at Abilene.

Southwestern University at Georgetown.

Texas Christian University at Fort Worth.

Trinity College at Waxahachie.

Westminster College at Tehuacan.

Institutions. The charitable and correctional institutions include the state penitentiaries at Huntsville and Rusk, insane hospitals at Austin, Terrell and San Antonio, a state orphans' home at Corsicana, a state epileptic colony at Abilene, a deaf and dumb institute at Austin, a Confederate soldiers' home, Confederate women's home, and a deaf, dumb, and blind institute for colored youths at Austin, a state juvenile training school at Gatesville, a state tuberculosis sanatorium at Carlsbad, and a girls' training school at Gainesville.

History. Cobeza de Vaca, a Spanish companion of Narvaez, visited Texas in 1528, but it was more than one hundred fifty years later that the first European settlement was made by La Salle. Many years later missions were founded by Spaniards at San Antonio. In 1730 the Indians began war on both French and Spaniards, but did not weaken the hold of either. After 1820 there was a vast immigration of citizens of the United States to Texas, the most important settlement being made at Austin. At about the same time the revolt of Mexico from Spain occurred, in which the Texans eagerly joined, but oppressive laws by the Mexican congress led to a revolt of Texas from Mexico, under the leadership chiefly of Americans, among them Sam Houston. Texas was successful in gaining its independence, though the fact was never recognized by Mexico. A republic was formed which was disorganized in 1845, when Texas was annexed to the United States and admitted as a state. This led to the Mexican War, which was terminated by the Treaty of Guadalupe Hidalgo, by which Mexico conceded the United States' demands.

In 1861 the state seceded from the United States and joined the Confederacy, to whose armies it furnished 90,000 soldiers during the Civil War. Under orders from President Johnson in June, 1865, a reorganized government was established, with a constitution abolishing slavery, renouncing the right of secession, conferring civil rights on freedmen and repudiating the Confederate state debt. However, Congress did not recognize the new government, and by the reconstruction acts of 1867 placed the state under military authority, with General Philip H. Sheridan in command. Until 1870 the carpetbag régime ensued, with disastrous results, but on March 30th of that year Texas was readmitted to the Union. Since then the state has enjoyed a prosperous development. A disastrous tidal wave nearly destroyed Galveston in 1900, but the damage was speedily repaired, and a sea wall and causeway were constructed to prevent another similar disaster. Of late years many progressive laws have been passed, including workingmen's compensation and mothers' pension acts. In 1919 the people voted in favor of state prohibition and rejected a woman suffrage measure.

Related Articles. Consult the following titles for additional information:

CITIES

Abilene	Denison	Paris
Amarillo	El Paso	San Angelo
Austin	Fort Worth	San Antonio
Beaumont	Galveston	Sherman
Brownsville	Greenville	Temple
Cleburne	Houston	Texarkana
Corpus Christi	Laredo	Tyler
Corsicana	Marshall	Waco
Dallas	Palestine	Wichita Falls

HISTORY

Alamo	Houston, Sam
Guadalupe Hidalgo,	Louisiana Purchase
Treaty of	Mexican War

RIVERS

Brazos	Pecos	Rio Grande
Canadian	Red	Sabine
Colorado		

TEXAS, UNIVERSITY OF, a state institution of higher learning, established at Austin, Tex., in 1876, but not opened until 1883. As organized it comprises a college of liberal arts and departments of engineering, education, law and medicine, the last being located at Galveston. A system of university extension courses is a successful and popular part of the organization. The income of the university is derived from a million and a half acres of land, set apart by the state. The faculty numbers nearly 200, and there are about 2,500 students. The library contains 130,000 volumes.

TEXTILE, *tex'til*, a woven fabric and the articles of clothing made from it, also the material suitable for weaving into the fabric. In a commercial sense, the term includes knit goods, felt, carpets and rugs. In the United States the textile industry, including the manufacture of clothing, is second only in importance and value to the steel industry. It gives employment to over 1,000,000 people, and the total value of its annual output is about \$1,750,000,000. The value of the output in Canada is about \$150,000,000. In England and Ireland the manufacture of textiles is the leading industry.

The manufacture of textiles did not become a separate industry until about 1800. Before that time each housewife spun the yarn, wove the cloth and made the clothing for the family. Later certain families in the neighborhood devoted their time to making cloth. Then came the invention of the spinning jenny by Hargreaves and the power loom by Cartwright, which completely revolutionized the textile industry, by making possible the factory system of the present time.

THACKERAY, **WILLIAM MAKEPEACE** (1811-1863), one of the greatest of English novelists, born July 18, 1811, in Calcutta, where his father was a collector of revenues. At the age of seven he was sent to England for his education, was placed at the Charterhouse School, London, and afterward continued his studies at Cambridge. He left the university without taking a degree and chose the career of an artist; but after spending some time in study at Paris, he became convinced that art was not his vocation, and having lost his fortune, he resolved to turn his attention to literature.



WILLIAM M.
THACKERAY

His first appearance in this sphere was as a journalist. Under the names of George Fitz-Boodle, Esq., or of Michael Angelo Titmarsh, he contributed to *Frazer's Magazine* tales, criticisms, verses and character sketches which were marked by extraordinary knowledge of the world, keen irony and playful humor. It was in this magazine that *The*

Yellowplush Papers, *Barry Lyndon*, *The Paris Sketchbook* and *The Irish Sketchbook* first appeared. In 1841 *Punch* was started, and Thackeray's contributions to that periodical, among others *Jeames's Diary* and the *Snob Papers*, brought him a measure of fame.

In 1836 Thackeray married Miss Isabella Shawe. Of his three daughters, one died in infancy, and in 1840 Mrs. Thackeray became hopelessly insane. Thackeray set himself to work much harder, and in 1846-1848 appeared, serially, his first great novel *Vanity Fair*, an incomparable picture of the snobishness and vulgar social climbing in the English upper class life of the time. Long before it was completed the author was unanimously placed in the front rank of British novelists. After *Vanity Fair* appeared *Pendennis*, a novel partly autobiographical; *Henry Esmond*, an accurate representation of eighteenth-century life in England, by some critics considered the greatest of English novels; and *The Newcomes*.

Thackeray made two lecture tours in the United States, the first in 1852, on *The English Humorists of the Eighteenth Century*, and the second, three years later, on *The Four Georges*. Subsequently he became editor of the *Cornhill Magazine*, in which was first published his *Lovel the Widower*, *The Adventures of Philip* and *The Roundabout Papers*. *The Virginians*, a short sequel to *Henry Esmond*, was published in 1857, and *Denis Duval*, his last novel, was left unfinished.

Thackeray's writings are remarkable always for their unflinching purity and simplicity of style. They are characterized throughout by keen satire, though they are never bitterly cynical. He ridicules sham and pretense in whatever guise, and is always quick to see what is good and genuine. Thackeray undoubtedly ranks as the foremost English satirist of the Victorian period and as one of the greatest novelists, essayists and critics in the literature of his country. His verse, half humorous, half pathetic, and often wholly extravagant, is always characterized by grace and spontaneity.

There is no important biography of Thackeray, but Trollope's *Thackeray*, in the English Men of Letters Series, gives interesting light on his life and ideas.

THALES, *thay'leez*, the earliest philosopher of Greece, and founder of the Ionian School of Philosophy, was probably born at

Miletus, about 624 B. C. He traveled and studied in Crete, Phoenicia and Egypt, and on his return became known as one of the seven wise men of Greece. He left no writings, but his sayings—among them the famous “know thyself”—became axiomatic and were handed down orally from generation to generation until Aristotle committed them to writing several hundred years after Thales’ death. Thales’ two famous pupils were Anaximander and Anaximenes.

THALIA, one of the nine Muses. She was the patron of comedy and pastoral poetry and was usually represented with the comic mask and the shepherd’s crook in her hand. One of the Graces was also called Thalia.

THALLIUM, a metallic element discovered in 1861 by Sir William Crookes. In its physical properties thallium resembles lead, but it is slightly heavier, somewhat softer and may be scratched by the finger nail. It melts under a red heat and is soluble in the ordinary mineral acids. In color it resembles silver, but is less brilliantly white. The tenacity of the metal is less than that of lead, but it is possessed of very considerable malleability. The compounds of thallium are exceedingly poisonous. Small quantities of thallium appear to be widely distributed in nature, the metal frequently occurring in natural sulphides.

THALLOPHYTES, *thal’o fites*, one of the four divisions of plant life, including the algae and fungi. Most thallophytes have thallus bodies, that is, their structure is not differentiated into such organs as stem, leaves, etc., See ALGAE; FUNGI.

THAMES, *temz*, the most important, though not the largest, river of Great Britain. It rises in Gloucestershire and, flowing in a general eastward direction, separates the counties of Wilts, Berks, Surrey and Kent on the south, from Gloucester, Oxford, Buckingham, Middlesex and Essex on the north. About sixty miles below London, through which it passes, it enters the North Sea, through an estuary twenty-seven miles wide. Other cities on its banks are Oxford, Reading, Maidenhead, Windsor, Chertsey and Kingston. The entire length of the river is 217 miles. It is navigable about 180 miles for light craft, and for sea-going vessels to London, where there are very extensive docks, extending for miles. It is connected by canal with the Severn. The Medway is the longest tributary.

THAMES RIVER, BATTLE OF THE, a battle fought on the Thames River, in the township of Oxford, Ontario, Canada, October 5, 1813, between a force of about 3,000 Kentucky volunteers, under General William Henry Harrison, and a British force of about 650 under General Proctor, aided by about 2,000 Indians under Tecumseh. The battle was opened by a famous cavalry charge led by Colonel Richard M. Johnson, who, it is said, personally killed Tecumseh. After retreating before General Harrison for several days, Proctor made a stand. The battle practically put an end to Indian coöperation with the British in the northwest.

THANE, a title of honor among the Anglo-Saxons. In early England a freeman who was not a noble might become a thane by acquiring a certain acreage of land, by making three sea voyages, or by taking holy orders. The title passed to his sons. The thane had the right to vote on important questions in the local and national assemblies. The title disappeared in England after the reign of Henry II.

THANET, OCTAVE. See FRENCH, ALICE.

THANKS’GIVING DAY, in the United States, an annual festival of thanksgiving for the blessings of the closing year. It is fixed by proclamation of the President and the governors of states, and ranks as a legal holiday.

The earliest harvest thanksgiving in America was kept by the Pilgrim Fathers at Plymouth in 1621, after the gathering of the first harvest, when Governor Bradley made provision for a day of thanksgiving and prayer. This custom was repeated often during that and the ensuing century. Congress recommended days of thanksgiving annually during the Revolution, and in 1784 for the return of peace. President Madison issued a proclamation of the same import in 1815. Washington appointed a similar day in 1789, after the adoption of the Constitution, and in 1795 he appointed another day as Thanksgiving Day for the general benefits and welfare of the nation. Since 1863 every President has issued each year a proclamation appointing the last Thursday of November as Thanksgiving Day.

THEATER, a building erected for the purpose of presenting dramatic or other spectacles.

Ancient Theaters. The first theaters of the Greeks, who were the founders of the

drama in its modern sense, were very rude structures. They were usually temporary wooden scaffolds, but in 500 B. C., an accident occurred, and in that same year the Athenians set to work to build the great theater of Dionysus, the first stone structure of the kind. Ruins of theaters exist in almost every city of Greece, and they all show similarity to this first theater in Athens. Among the Greeks and Romans, theaters were the chief public edifices next to the temples, and in point of magnitude they surpassed the most spacious of the temples, having in some instances accommodation for as many as 10,000 to 40,000 spectators.

The Greek and Roman theaters very closely resembled each other in their general form and principal parts. The building was of a semi-circular form, resembling the half of an amphitheater, and it was not covered by a roof. In Greece the semicircular area was often scooped out in the side of a hill, but Roman theaters were built on the level. The seats of the spectators were arranged in tiers up the semicircular slope. The part of the theater in which the spectators sat was usually called the *cavea*, or pit, because it was excavated, and this name is still applied to the lowest part of the audience room in a modern theater.

The stage, or place for the players, a narrow platform along the straight side of the theater, was in front of the seats. Behind this rose a high wall, resembling the façade of a building, this being intended to represent any building in front of which the action was supposed to take place. This was called in Greek *skēnē*, the stage being called *proskēnion*. The semicircular space between the stage and the lowest seats of the spectators was called *orchestra* and was appropriated by the Greeks to the chorus and musicians, and by the Romans to the senators. Scenery, in the modern sense of the word, was not employed, except in a very rude form, but the stage machinery seems in many cases to have been elaborate; and in particular there was a well-known machine or contrivance of some sort, from which deities made their entrance, as if from the sky.

The immense size of the ancient theaters made it impossible for the unaided voice to be heard by the whole audience. To remedy this, the actors wore metallic mouthpieces very similar to megaphones. In comedy the actors wore a light shoe, called the sock, a

term often used to designate comedy, in contradistinction to tragedy, in which a *buskin* or high-heeled shoe was worn by the actor, to make him appear taller. The actors were males, the characters of women being represented by young men. The performances, which always included a series of plays, often lasted from sunrise until sunset. A price was charged for admission until the time of Pericles, when the poorer classes, and later all the citizens, were admitted at the cost of the State. In earlier times women were allowed to witness the tragedies only, but later they attended all representations.

Medieval and Early Modern Periods. Between the decline of the ancient, and the rise of the modern, drama there is a long interval, in which the nearest approach to theatrical entertainments is found in miracle plays, mysteries and interludes. These performances took place in churches, convents or halls or in the open air. Sometimes the stage was roofed, in which case the ends of it were used by the fashionable patrons, an arrangement which later gave rise to the use of boxes.

In 1548 the Confraternity of the Trinity opened a theater in Paris, in which secular pieces were performed. The first theater erected in Italy seems to have been that of Florence, built in 1581, but the first building that approaches the modern style was one constructed at Parma in 1618. In England there were organized companies of actors as far back as the time of Edward IV; but as there were no regular playhouses, the performances took place in tennis courts, inn yards and private houses. The London Theater was built by James Burbage before 1576, and the Curtain in Shoreditch and the playhouses in Blackfriars and Whitefriars date from about the same time. Shakespeare's plays were brought out at the house in Blackfriars and at the Globe on the Bankside, both of which belonged to the same company, to whom James I granted a patent in 1603. The Globe was a six-sided wooden structure, partly open at the top and partly thatched. Movable scenery was first used on the public stage by Davenant in 1662, and about the same time this manager introduced women to play female characters, hitherto taken by boys and men.

Theaters of To-day. Present-day theaters are elaborate structures. The auditorium, usually in horseshoe shape, is highly deco-

rated and has sloping floors, from one to four balconies, boxes and orchestra. The stage is extensive in size, with adjuncts of curtain, "flies," lighting arrangements and dressing rooms. The shifting of the scenes requires a large number of men.

Since the disastrous Iroquois Theatre fire in Chicago, in 1903, in which 572 persons perished, strict regulations have been enforced in most countries as to the number and accessibility of exits and the separation of the auditorium from the stage by an asbestos or sheet-iron curtain.

Mechanical devices and the use of electricity for power and lighting make possible almost any scenic effect on the modern stage. These, together with the literary genius that has been thrown into dramatic writing in the past fifty years, have raised the theatre when at its best to one of the most cultural and educational influences of our time. All the other arts are enlisted in the production of the drama.

Moving Picture Theatre, an auditorium for the display of moving pictures, commonly a rectangular room with a curtain at one end, upon which the pictures are thrown. Some moving picture theatres, however, are very elaborately decorated and are furnished with permanent facilities for music. In some cases, also, theatres built for the legitimate play are adapted to the use of moving picture performances during the summer months.

Related Articles: Consult the following titles for additional information:

Colosseum Drama Moving Picture

THEBES, *theebz*, EGYPT, ancient capital of the country and for centuries the seat of government of the Pharaohs. It is situated in Upper Egypt, on both sides of the Nile, about 300 miles southeast of Cairo, and is now represented by the four straggling villages of Luxor, Karnak, Medinet Habu and Kurach, as well as by the most impressive ruins of antiquity, extending about seven miles along the river.

The city reached its period of greatest prosperity from 1500 to 1000 B.C. The ruins comprise magnificent temples, rock-cut tombs, obelisks decorated with beautiful sculptures, long avenues of sphinxes and colossal statues. The largest of the temples is that at Karnak. Above Karnak are the village and temple of Luxor. The Memnonium, or temple of Rameses II, the temple and palace of Rameses III, and the colossal statues of Amenoph III, one of them known

as the vocal statue of Memnon, are of great historical interest. In the near-by "Valley of the Kings", excavations have revealed tombs of ancient Kings,—of Seti I, discovered by Belzoni, and of Tut-an-kh-amen, uncovered in 1923, the latter containing relics of utmost artistic and historic value.

THEBES, GREECE, a celebrated ancient city, at one time the supreme power in Greece, is situated about forty miles north of Athens and about midway between Mount Helicon and the channel separating Euboea from the mainland. The cycle of legends associated with Thebes is almost as famed as that identified with Troy. It was the chief city of Boeotia, and the birthplace of Pindar, Epaminondas and Pelopidas. It is said to have been founded by Cadmus, 1500 B. C. Under the leadership of Epaminondas it became the most important city and state of Greece; this supremacy came to an end with his death in 362 B.C. Under Roman rule it again became prosperous, but declined under the Turks. The present village is of little importance; it has a population of approximately 3,500.

THEINE, *thé'in*. See **CAFFEINE**.

THEMES, OUTLINES FOR. The selection of material is the first step in writing an essay. The second step is arranging that material so that the composition, when completed, will read smoothly and have an orderly development. There is no better way of securing smoothness and order in an essay than by making an outline before beginning to write. The outlines which follow will suggest to teachers and pupils how the different types of essays may be planned. Attention is also called to the numerous outlines scattered throughout these volumes.

Descriptive Themes

THE RAINBOW

What it looks like
 An arch across the sky
 Its different colors
 Where its ends seem to rest
 Made up of two bows
 A brighter and a fainter bow
 How they differ in color arrangement
 Where the rainbow is always seen
 In that part of the sky opposite the sun
 The higher the sun, the lower the bow
 Why?
 No bow visible when the sun is above 40°
 Is there another side to the bow?
 The reason for the rainbow
 Reflection and refraction of the sun's rays
 falling on raindrops
 Why there are seven colors

Who first correctly explained the rainbow?
 Where small rainbows may be seen
 In the spray of waterfalls
 In the soapbubble
 The Bible story of the bow
 Told in Genesis, Chapter IX
 What sailors say about it
 Rainbow at night, sailors delight;
 Rainbow in the morning, sailors take
 warning.

THE OAK

The monarch among forest trees
 Symbol of strength and sturdiness
 Its defiance of time and tempest
 What it looks like
 Wide-spreading branches
 Bears two kinds of flowers
 Beauty of its leaves
 How it grows
 From small seeds called acorns
 Acorns used as food in some countries
 Meaning of the proverb, "Tall oaks from
 little acorns grow"
 Uses of the oak
 Wood valuable in carpentry because of its
 beauty, durability and strength
 Bark used in tanning and dyeing
 Shade and ornamental tree
 The oak in history
 Chaplet of oak leaves a token of honor worn
 by Roman soldiers
 Sacred oaks of the Druids in Britain
 Charter Oak of Connecticut
 The oak in literature
 The Forest Hymn, by Bryant; The Oak, by
 Lowell; A Song of the Oak, by Chorley.

A SNOWSTORM IN THE COUNTRY, BASED ON
WHITTIER'S "SNOWBOUND"

First signs of the coming storm
 Dark circles about the noonday sun
 Afternoon sun hidden by threatening clouds
 Rising of a bitterly cold wind
 The storm in its fury
 The snowflakes in a wild dance
 Drifts pile against the window frame
 Storm rages all night and the next day
 The day after the storm
 The blue sky above a universe of snow
 What the snow-covered farm structures
 look like
 Farmer summons the boys to dig paths
 Tunneling through the drifts
 Rescuing the barn animals from a hunger
 siege
 The farm that evening
 Beauty of the snow-covered hills in the
 moonlight
 Contrast between snow and dark hemlock
 trees
 The snow-bound farm folk
 Around the evening hearth fire
 The feast of cider, apples and nuts
 Stories of days gone by

ABOUT LEAVES

Parts of a typical leaf
 Blade, or flattened part of the leaf
 Petiole, or stem of the leaf
 Stipules, or expansions at base of petiole

What the leaf is made of
 Upper and lower surfaces of membrane,
 called epidermis
 Breathing pores in epidermis, called sto-
 mata
 Layers of cells between the surfaces
 Leaf green, or chlorophyll, found in certain
 cells
 Threads of fiber, forming ribs and veins
 What the leaves do
 Manufacture sugar and starch to feed the
 plant
 Act as lungs for the plant
 Send into the air surplus water taken from
 the sap
 Fallen leaves make a deep carpet that pro-
 tects the roots of trees from frost
 Why the leaves fall
 Their food materials are absorbed by the
 branches and roots, to be stored through
 the winter, and so they wither and fall off
 Why the leaves turn red and yellow in au-
 tumn
 Because of chemical changes in the cells
 Jack Frost is not the painter of the leaves

Narrative Themes

A DISCARDED DOLL SPEAKS ON A CHRISTMAS DAY
 My appearance
 I have lost one eye and an arm
 The sawdust has oozed out of one leg
 My nose is broken off
 I have no hair
 I am wrapped in an old piece of cloth
 My home and companions
 I live in a dark corner in an attic
 My companions are a broken tin soldier, a
 woolly lamb with one leg gone, and a
 head-less doll
 How I came to this sad condition
 My little mistress grew tired of me
 She gave me to her little brother
 He "banged" me around
 At housecleaning time I was cast aside
 My former state
 I was a loved and welcomed gift last Christ-
 mas morning
 My hair was curly and I was beautifully
 dressed
 My little mistress showered me with kisses
 My decline
 A rival doll appeared
 I was no longer treated with respect after I
 lost my eye
 Little brother's treatment broke my heart
 Moral
 Dolls should form a union to protect their
 rights

STORY OF THE AMERICAN FLAG

Colonial flags of 1775 and 1776
 "Conquer or die," standard of Concord
 Pine-tree flag of Bunker Hill
 Grand Union flag of 1776, unfurled at Cam-
 bridge
 First national flag
 Adopted by Congress on June 14, 1777
 Thirteen stripes and thirteen stars
 First flag made by Betsy Ross
 Stars and Stripes float above Fort Stanwix
 in August, 1777

Flag of fifteen stripes and fifteen stars
 Adopted on admission of Vermont and Kentucky, 1795
 Floats over Fort McHenry in 1814, inspiration of national anthem, The Star-Spangled Banner
 Congressional act of 1818
 Provided for a flag of thirteen stripes
 Each state is to be represented by a star
 Starry field has now forty-eight stars
 What the flag stands for

THE PIED PIPER OF HAMELIN
 (Based on Browning's Poem)

Hamelin town in Brunswick
 A pleasant town on the river Weser
 The pest of rats
 Petition of the people
 Mayor and Corporation threatened
 The entrance of the Pied Piper
 Proposition made by the Piper
 To free the town of rats
 To be paid 1,000 guilders
 The Piper blows his pipe
 The rats by thousands come tumbling out of the houses
 They follow him to the river
 The rejoicing of the people
 The Piper demands his pay
 Refusal of the Mayor
 The Piper's revenge
 The town children are enticed to the mountain
 The mountain swallows them all
 Lamentations of the lame boy left behind

STORY OF THREE BUTTERFLIES

Who the butterflies were
 A white, a red and a yellow one
 What they were doing
 Playing in the sunshine
 Dancing from flower to flower
 It begins to rain
 Their wings get wet
 The door of their house is locked
 Their appeal to the red and yellow tulip
 The tulip refuses to shelter the white butterfly
 The red and yellow ones will not desert her
 They fly to the lily
 The lily will shelter only the white one
 The white one will not desert her sisters
 The sun is pleased
 He drives away the rain
 The wings of the butterflies dry
 They dance again in the garden

Expository Themes

ON THRIFT

What is thrift?
 Being saving of
 Money, time, health, energy
 Being careful in little things
 Overcoming negligence and forgetfulness
 The moral value of thrift
 It disciplines the character
 It develops self-control
 It trains the will
 It helps one form good habits
 The practical value of thrift
 It enables one to save money

It is preparation for a rainy day
 The thrifty are always well provided for
 They need not fear sickness or old age
 They can help good causes
 Who should practice thrift
 The individual
 The family
 The nation

ON PATRIOTISM

What is patriotism?
 Love for country
 A universal feeling
 How true patriotism is expressed
 In time of peace
 By obeying the law
 By working for better laws
 By voting intelligently
 By making sacrifices for the public good
 By observing national holidays
 In time of war
 By consecrating to one's country
 Time, money, service, life itself
 By bearing burdens cheerfully
 By honoring the flag
 By being loyal in word, thought and act
 Examples of true patriots
 Joan of Arc
 Horatio Nelson
 Garibaldi
 Nathan Hale
 Abraham Lincoln

GOOD HEALTH

The blessings of health
 Adds to the enjoyment of life
 Increases efficiency
 Insures long life
 Adds to happiness of others
 How health is maintained
 Food and drink
 Choice of nourishing, simple foods
 Avoidance of tobacco, liquor and highly seasoned foods
 Moderation in use of sweets, tea and coffee
 Exercise and breathing
 Daily exercise in fresh air
 Cultivation of outdoor games and sports
 Deep breathing exercises
 Rest and recreation
 Regular sleep in ventilated room
 Avoidance of over fatigue
 Mental relaxation—music, reading, etc.
 Avoidance of dissipation and late hours
 Cleanliness
 The daily bath
 Care of teeth, nails and hair
 Sanitary surroundings
 Clean clothing

BASKET BALL

The field
 Average dimensions
 How marked off
 Suspended basket nets for goals
 The ball
 Inflated bladder in round leather case
 Dimensions and weight
 Two teams consisting each of
 One center

- Two forwards
- Two guards
- The game
 - Played in two halves
 - Intermission of ten minutes
 - Winning side makes the most baskets
- Scoring
 - A basket counts two points
 - Free throws
- Rules
 - Position of players
 - Their duties
 - Fouls
- Why basket ball is beneficial
 - It develops
 - Alertness
 - Self-control
 - The muscles
 - Good sportsmanship
- It can be played
 - Indoors and outdoors
 - By either sex

Argumentative Themes

WOMEN SHOULD HAVE THE VOTE

- To restrict the vote to men is unjust
 - It is not fair to class women with criminals, idiots and the insane
 - Tax-paying women should have a voice in legislation
 - Women as a whole are as deserving of suffrage as men
 - To deprive them of the vote is contrary to the principles of democracy
- Woman suffrage would benefit the state
 - Women have keener convictions than men on moral issues
 - As a rule they will vote for reforms
 - Example—they favor prohibition
 - Women would favor honest officials
- Woman suffrage would benefit women themselves
 - Voting women would be aroused to greater interest in political and civil questions
 - They would work for better laws pertaining to the home, the school and social conditions
- Woman suffrage has proved successful
 - It has been tried and been found a success in Denmark, Norway, Australia, New Zealand, Iceland, Canada and several states of the United States

THE SUMMER VACATION FOR SCHOOLS SHOULD BE ABOLISHED

- The present system is wasteful
 - It is poor economy to have the schools idle for so many weeks
 - The time lost can never be regained
- The long vacation has a bad effect on the pupils
 - They form idle habits
 - They lose in efficiency
 - They forget how to concentrate
 - It takes a long time to overcome this slackness
- Proposed remedy
 - Division of year in four terms, and each term into halves
 - School the year round
 - Six-weeks vacation as needed

- Advantages of new plan
 - Pupils can complete school course in shorter time
 - Those who leave school early to go to work are better prepared than under old plan
 - Gain in economy and efficiency

CAPITAL PUNISHMENT SHOULD BE ABOLISHED

- Capital punishment is contrary to the moral code
 - The taking of a life should be left to Providence
 - No government should assume the responsibility of sending a soul to eternity
- Capital punishment is unnecessary
 - Imprisonment for life serves the purpose of:
 - Punishing the criminal
 - Protecting society
- Capital punishment has evil effects
 - It lowers the public sense of the sacredness of life
 - The publication of the details of an execution are revolting
- Capital punishment tends to thwart the ends of justice
 - Many jurors would prefer to acquit a man than to sentence him to death
- Capital punishment is unsound in theory
 - It does not aim to reform the criminal
 - It exalts the idea of revenge
 - The revenge idea tends to arouse antagonism and to encourage crime
- Prison reform should be substituted
 - It is more humane
 - It may make a good man out of a criminal
 - It is the only enlightened method of punishment

- Capital punishment has been outlawed in many countries

- Many great thinkers have been opposed to it.

MILITARY TRAINING IN HIGH SCHOOLS IS DESIRABLE

- Military drill is healthful
 - It develops the muscles
 - It straightens the shoulders
 - It expands the chest and lungs
- Such training is morally beneficial to the individual
 - It increases mental alertness
 - It is a splendid form of discipline
 - It encourages self-respect and obedience
- Military training of youth is a benefit to the nation
 - It provides the foundation for national defense
- High school drill is preferable to universal military service
 - It does not interfere with industry
 - It gives training to growing youths

THEMIS, goddess of law and justice among the Greeks, the daughter of Uranus and Gæa (Heaven and Earth) and one of the wives of Zeus and the mother of the Horæ (Hours) and Moeræ (Fates).

THEMISTOCLES, *the mis'toh kleez* (about 514-449 B. C.), one of the most celebrated of Athenian generals and statesmen, who won his greatest victory at the age of

thirty and by his naval policy at that time laid the foundation for future Athenian supremacy. After the Battle of Marathon, 490 B. C., he convinced the Athenians, most of whom believed that the struggle with Persia was over, that there was still need for preparation, and he induced them to build a fleet. On the invasion of Greece by Xerxes, Themistocles succeeded in obtaining the command of the fleet, and in the Battle of Salamis (480 B. C.) he conquered the Persians and saved Greece. Subsequently he was accused of having enriched himself by unjust means and of being privy to designs for the betrayal of Greece to the Persians. Fearing the vengeance of his countrymen, after many vicissitudes he took refuge at the Persian court in 465 B. C. Some authorities assert that he committed suicide by taking poison, but there is no positive knowledge of it.

THEOCRACY, *the ok' ra sy*, literally, "government by God," the name given to a state in which God is regarded as the sole sovereign, and the laws of the realm are considered to be divine commands rather than human ordinances. The priesthood, therefore, become the interpreters of the "divine commands," act as the officers of the Invisible Ruler, and have authority as well in civil matters. The typical example of a theocracy is that established by Moses among the Hebrews. The governments of colonial Massachusetts and Connecticut were at times theocratic in nature.

THEODORIC, *the od'o rik* (about 454-526), king of the Ostrogoths, generally known as THEODORIC THE GREAT, founder of the Ostrogothic kingdom in Italy. He was born in Pannonia, and from his eighth to his eighteenth year he lived as a hostage with Emperor Leo at Constantinople. Upon the death of his father, in 474, Theodoric became chief ruler. In 488 he invaded Italy, defeated Odoacer and compelled the latter to grant him equal authority. The murder of Odoacer opened the way for Theodoric to have himself proclaimed sole ruler. He ruled with vigor and ability, abandoning war almost entirely. He introduced an improved administration of justice, and encouraged industry and the arts of peace. During his reign his country enjoyed a period of great prosperity. Although, like his ancestors, he was an Arian, he never violated the peace or privileges of the Catholic Church. See GOTHs, subhead *Ostrogoths*.

THEODOSIUS, *the o dok' she us*, the name of three Roman emperors, namely, Theodosius I, surnamed the Great (379-395); Theodosius II, emperor of the East from 408 to 450; Theodosius III, Byzantine emperor (716-717).

Theodosius I. was born in Spain. He was selected by the Emperor Gratian, in 379, as his partner in the empire. To his care were given Thrace and the Eastern provinces, which he delivered from an invasion of the Goths, concluding a peace with them in 382. On the defeat and death of Maximus, he became the sole head of the Empire, Gratian having been killed in the war against Maximus. In 390 a sedition took place in Thessalonica, and to satisfy his vengeance Theodosius caused the people of the city to be invited to an exhibition at the circus and then had them barbarously murdered, to the number, it is computed, of seven thousand. Saint Ambrose refused him communion for eight months on account of this crime, and Theodosius submitted humbly to the punishment. At his death he left the eastern portion of the Empire to his son Arcadius, the western to his son Honorius.

Theodosius II. was the only son and successor of Arcadius. During his reign the Empire was invaded by the Huns under Attila and a war was waged with Persia.

Theodosius III. was an unimportant Byzantine emperor who abdicated after a few months' reign.

THEOLOGY, *the ol'o jy*, the science which treats of the existence of God, his attributes and the divine will regarding human actions, present condition and ultimate destiny.

A sharp distinction was formerly drawn between *natural* and *revealed* theology. The former, or *philosophical theology*, relates to the knowledge of God from His works, by the light of nature and reason; the latter, or the *supernatural, positive, or revealed*, theology, sets forth and systematizes the doctrines of the Scriptures. With regard to the contents, theology is classified into *theoretical theology*, or *dogmatics*, and *practical theology*, or *ethics*.

As comprehending the whole extent of religious science, theology is divided into four principal classes: these are *historical*, treating of the history of Christian doctrines; *exegetical*, embracing the interpretation of the Scriptures and of Biblical criticism; *systematic*, arranging methodically the great truths of religion; *practical*, consisting, first of precepts and directions, as well as motives by which we should comply with them. *Apologetic* and *polemic* theology belong to several of these four classes at once. The

scholastic theology attempted to clarify and discuss all questions with the aid of human reason alone, putting aside the study of the Scriptures and adopting, instead, the arts of the dialectician.

THEOSOPHY, *the os' o fy*, according to its etymology, the science of divine things. However, the name is sometimes applied to the philosophy of those who, in their inquiries respecting God, have run into mysticism, as Jacob Böhme, Swedenborg, Saint Martin and others.

At the present day the term is applied to the tenets of the Theosophical Society, founded in New York in 1875 by Colonel Henry S. Olcott, the objects of which are (1) to form the nucleus of a universal brotherhood of humanity; (2) to promote the study of Eastern literature and science; (3) to investigate unexplained laws of nature and the psychical powers of man, and (4) to search after divine knowledge—the word divine meaning the true nature of the abstract principle, not the quality of a personal God. The theosophists assert that humanity is possessed of certain powers over nature which the narrower study of nature, from the merely materialistic standpoint, has failed to develop. Their so-called occult manifestations are akin to those attributed to spiritualism or telepathy, that is, communication between minds at a distance from each other.

Theosophical Society. Madame P. Blavatsky, a Russian, was the founder of the Theosophical Society, and her book, *The Secret Doctrine*, is the authoritative book on the modern philosophy. In 1878 she and Colonel Olcott left New York for India, where a system of propaganda was developed and numerous branches formed. Upon her death, she was succeeded by William O. Judge and Annie Besant, jointly. In 1895 the American section unanimously declared its autonomy as the "Theosophical Society in America," with Judge as its president; Annie Besant became head of the Esoteric Section, an inner body. In 1898 Katherine A. Tingley organized "The Universal Brotherhood Organization," and became absolute ruler. In 1916 Mrs. Besant was elected president of the parent society, with headquarters at Adyar, Madras, India.

THERAPEUTICS, *ther a pu'tiks*, that branch of medicine which treats of the discovery and application of remedies for

curing disease. In its broadest sense the term includes every form of treatment and, with a qualifying term, may be applied to any system of treatment. *Medical* therapeutics includes treatment by drugs; *electrical* therapeutics, by X-ray and other forms of the electric current; *general* therapeutics, treatment by dieting, massage, sunlight, etc; *mental* therapeutics, by suggestion and direction of the mental attitudes; *bacterial* therapeutics, treatment by serums, vaccination and antitoxins.

Related Articles: Consult the following titles for additional information:

Hydrotherapy	Pharmacopoeia
Massage	Roentgen Rays
Materia Medica	Surgery
Medicine	

THERE'SA, SAINT (1515–1582), a famous Carmelite nun and mystical writer, born at Avila, in Spain. She entered a convent of the Carmelites in 1534, where she remained for nearly thirty years.

She undertook to restore the original severity of the institute, and the first convent of reformed Carmelite nuns was founded at Avila in 1562. During the life of the founder, who took the name Teresa de Jesus in 1562, seventeen convents for women and sixteen for men accepted her reforms. She was canonized by Pope Gregory XV in 1622. Teresa was the author of several works, all of a devotional nature, among them a very curious autobiography, which has been translated into English.

THERMAL, *thur'mal*, **SPRINGS**, or **HOT SPRINGS**, springs the temperature of which is higher than that of the land where they occur. In high altitudes this temperature may be only a few degrees above freezing point; in volcanic regions it reaches the boiling point of water. In some localities thermal springs are subject to eruption (see GEYSER), but most of them are quiet boiling pools. The crater of the spring extends to a great depth, and the water is heated by contact with the hot rocks below. Most thermal springs hold siliceous and calcareous matter in solution and deposit it around their sides and along their edges, often making beautiful formations. The waters of some thermal springs are valuable for their medicinal properties, as the Hot Springs, Ark., and Hot Springs, S. D. See MINERAL WATERS.

THERMOELECTRICITY. If an iron wire and one of nickel silver are joined and the loose ends attached to a galvanometer,

when the joined ends are heated the galvanometer will show that an electric current is passing over the wires. If the iron and nickel silver are replaced by antimony and bismuth a stronger current will be manifest. *Thermoelectricity* is the name applied to an electric current generated by joining two or more unlike metals and subjecting them to a change of temperature. To insure the best success in practice, the metals should differ in their power to conduct heat. Bismuth and antimony possess this difference in the greatest degree of any metals readily obtainable; therefore they are generally used. The thermoelectric battery, or pile, an apparatus much used in delicate experiments with radiant heat, consists of a series of little bars of antimony and bismuth, or any other two metals of different heat-conducting power, with their ends soldered together and arranged in a compact form, the opposite ends of the pile being connected with a very sensitive galvanometer. To the combined arrangement of pile and galvanometer the name of *thermo-multiplier* is given. The slightest change in temperature generates a current which is manifest in the galvanometer. The instrument is used for detecting minute changes in temperature.

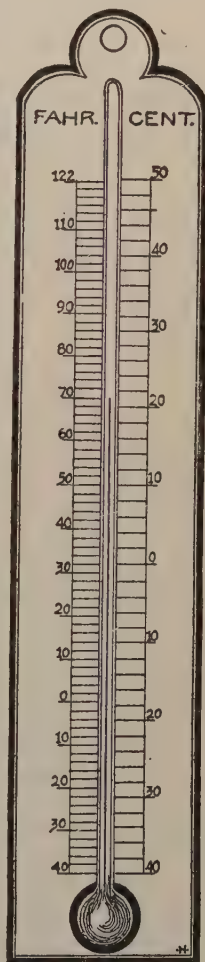
THERMOGRAPH, *ther' mo graf*, a self-recording thermometer. The American instrument, which is the one in most common use, consists of a circular paper disk, graduated on its circumference into hour and minute spaces and divided by concentric circles into spaces indicating degrees of temperature. The disk is moved by clockwork, which causes it to make a revolution once in twenty-four hours. A needle carrying a pen or pencil is so attached to the thermometer that it marks the temperature on the disk, making a complete circuit in a day. See THERMOMETER.

THERMOMETER. If you take hold of an iron rod that has just been removed from the fire, it feels *hot*; on the other hand, if you touch a piece of ice, it feels *cold*. The cause of these sensations is said to be *heat*. The warmer body always gives off heat to a colder. For many years it was believed that heat was a fluid, called "caloric;" about the middle of the nineteenth century the experiments of Joule proved that a definite amount of mechanical work is equivalent to a definite form of heat. In other words, *heat is a form of energy*. Heating or cooling is merely a

transformation of *temperature* or "heat level," as before we might have spoken of a higher water level.

To measure temperature the simplest instrument in use is the thermometer, a long glass tube on one end of which is a bulb partly filled with mercury. The tube is open at the upper end after the mercury is poured in. The bulb is then heated till the mercury rises to the top, when the tube is sealed by means of a blow-pipe. As the bulb cools the mercury recedes, leaving a vacuum at the upper end of the tube. It is clear that there must be some point at which all thermometers agree. Careful investigations have made it certain that under uniform conditions the temperature of *melting ice* and that of *steam* are invariable. These points are generally known as *freezing point* and *boiling point*. On the centigrade scales (centigrade from *centum*, meaning hundred, and *gradus*, meaning steps) the freezing point is marked 0° Centigrade and the boiling point 100° . On the Fahrenheit scale (named after the German scientist Fahrenheit) the freezing point is 32° and the boiling point 212° . Most household thermometers are marked in the Fahrenheit scale, but for scientific purposes the Centigrade scale is much better, because it is readily reduced to decimals.

It frequently happens that we are called on to change temperature readings from the Centigrade scale to the Fahrenheit, or from Fahrenheit to Centigrade. We know that 100° C. equal 212° — 32° or 180° F. (the abbreviations C. and F. are commonly used instead of writing out the



THE THERMOMETER
Showing both Fahrenheit and Centigrade scales.

words). We are asked to find the equivalent in Fahrenheit degrees of a reading of 60°C . We know that

$$100^{\circ}\text{C.} = 180^{\circ}\text{F.}$$

$$\text{Then } 1^{\circ}\text{C.} = 1^{\circ}.8\text{F.}$$

$$\text{Therefore, } 60^{\circ}\text{C.} = 108^{\circ}\text{F.}$$

In other words, 60°C . above zero will equal 108°F . above the freezing point, because that is the Centigrade zero. But the Centigrade zero is 32 on the Fahrenheit scale. So we must add 32 degrees to give the true reading above the Fahrenheit zero.

$$\text{Therefore, } 60^{\circ}\text{C.} = 108^{\circ}\text{F.} + 32^{\circ}\text{F.} = 140^{\circ}\text{F.}$$

To change a reading from the Fahrenheit scale to the Centigrade scale is just as simple; we reverse the process. To change 40°F . to Centigrade degrees, we first subtract 32°F . in order to find how many Fahrenheit degrees above the freezing point remain to be changed to Centigrade units. In this case we find there are 8°F . above the freezing point. We already know that

$$180^{\circ}\text{F.} = 100^{\circ}\text{C.}$$

$$\text{Then } 1^{\circ}\text{F.} = \frac{5}{9} \text{ or } 0.555^{\circ}\text{C.}$$

$$\text{Therefore, } 8^{\circ}\text{F.} = 4.44^{\circ}\text{C.}$$

It is possible that a reading above zero on the Fahrenheit scale will be below zero on the Centigrade. In this case our answer would be in minus degrees Centigrade, in other words, below zero.

For the purpose of measuring the quantity of heat gained or lost by a body when its temperature changes, it was necessary to adopt a unit of heat. The one commonly used in connection with the metric system is the quantity of heat that will raise the temperature of one gramme of water one degree Centigrade. It is called a *calorie*. The number of degrees required to raise the temperature of a body through one degree Centigrade is the thermal capacity (from the Greek word *thermos*, which means heat) of the body. The thermal capacity of a unit mass of a substance is its *specific heat*. Specific heat bears the same relation to a calorie as specific gravity does to *g* or gravity, which we have already studied. For example, the specific heat of mercury is 0.033; this means that the heat which will raise 1 gramme of mercury through 1 Centigrade will raise 1 gramme of water through only 0.033 Centigrade. See HEAT; PHYSICS.

THERMOPYLAE, *thur mop' il lee*, a mountain pass in Greece, famous as the scene of one of the most stirring military events in

history. It lies south of the river Spercheus, between Mount Oeta and the Maliac Gulf, and is a gateway from Thessaly into Locris. In ancient times it was only fifty feet wide, and was the only pass by which an army could enter Southern Greece from the north. When Xerxes, king of Persia, with his vast army invaded Greece in 480 B. C., he found the pass defended by Leonidas, king of Sparta, in command of 300 Spartans and 5,000 allies. For two days he unsuccessfully attempted to force a passage. At the end of the second day's fighting the Greeks were betrayed by Ephialtes, a Thessalian, who showed the invaders a path over the mountains. The Persians crossed and attacked the Spartans in the rear. Although overwhelmed by the vast hordes of the enemy, Leonidas and his followers fought to the last, not a Spartan escaping.

In 279 B. C. Brennus of Gaul attempted to invade Greece by way of the famous pass, but was held in check there; and he, too, succeeded in entering only after a path over the mountains was discovered.

The traveler who to-day visits this scene of ancient heroism finds not a narrow pass, but a swampy plain from one to three miles wide formed by the alluvial deposits of the Spercheus. An interesting feature is a group of hot springs, which gave the pass its name, which means, literally, *hot gates*.

THERMOS BOTTLE, in its commonest form, a double glass container enclosed in a metal case, so constructed as to keep liquids poured into it either hot or cold. The inner glass vessel is fused to the outer after the air between them has been thoroughly exhausted, and the vacuum thus created acts as a nonconductor of heat either from without or within. Within recent years the container has been made of metal; this is a valuable improvement, as glass containers break quite easily. Thermos bottles are of great convenience to travelers who have not access to hot food, and are widely used by automobile tourists and picnickers.

THESEUM, any temple dedicated to Theseus. The most famous of these was the one built at Athens, northwest of the Acropolis, in 473 B. C. The whole was decorated with beautiful paintings, representing events in the legendary life of Theseus. No trace of it remains. The name now commonly refers to a temple at Athens, probably that of Hephaestus, which is the best preserved of Greek

temples. It is of Doric style and is made of Pentelic marble. There are thirteen columns



THESEUM AT ATHENS

on the side, nineteen feet high. The frieze represents myths of Hercules and Theseus. The interior was entirely changed in the early Christian Era to adapt it to church purposes.

THESEUS, *thé'se us*, or *thé'suse*, a legendary king of Athens, son of Aegeus and Aethra. He was reared in seclusion by his mother, and when he became a man he journeyed to Athens, where he was recognized as heir to the throne. Medea, a sorceress, tried to kill him, but failing fled to Media.

When Theseus learned that Athens, as the result of a defeat in war, was compelled to pay to Crete a yearly tribute of seven youths and seven maidens, to be devoured by the Minotaur, he volunteered to go himself with the next victims and, if possible, to kill the monster, which was kept in a vast labyrinth. Theseus promised his grief-stricken father that, if successful, he would on his return change the sails of the ship from black to white. With the aid of Ariadne, daughter of the king of Crete, he escaped from the labyrinth after having killed the Minotaur, and taking the princess with him, set out for home with his joyous companion. He seems to have been a very ungrateful and inconstant lover, for he abandoned Ariadne on an island. Forgetful, too, of his promise to his father, he did not hoist the white sail, and Aegeus, when he saw from far off the black sail approaching, threw himself into the sea, which has been named for him (Aegean).

Theseus became king of Athens, and many were the wonderful deeds which he did. For a time he was greatly beloved by his people, but in his later years he grew tyrannical and was at length banished from his kingdom. See MINOTAUR; ARIADNE.

THESSALO'NIANS, EPISTLES TO THE, two New Testament epistles, written by Saint

Paul to the church at Thessalonica, in all probability during his long stay at Corinth, therefore not very long after the foundation of the Thessalonian church on Saint Paul's second missionary journey.

THES'SALY, the northeastern division of Greece, consisting, mainly, of a rich plain, enclosed between mountains. Mounts Pelion and Ossa, on the east, and on the northeast, Mount Olympus, fabled abode of the gods, are the most celebrated peaks.

In the earliest times Thessaly proper is said to have been inhabited by Aeolic and other tribes. Subsequently it was broken up into separate confederacies, and it seldom exerted any important influence on the affairs of Greece. Thessaly was conquered by Philip of Macedon in the fourth century B. C., became dependent on Macedonia, and was finally incorporated with the Roman Empire. After the fall of the Byzantine Empire it came into the hands of the Turks, who held it until 1881, when it was formally ceded to Greece by the terms of the Congress of Berlin. The majority of the inhabitants are Greeks.

The present political divisions of Thessaly are the departments of Phthiotis, Larissa, Karditsa, Trikkala and Magnesia. The total population is 575,000. Volo is the most important port.

THETFORD MINES, QUE., in Megantic County, on the Quebec Central Railroad, seventy-six miles from Quebec. The name indicates sufficiently the character of the industries; the city is in the richest asbestos district in the world. There are sash and door factories, sawmills, foundries and manufactures of cement blocks. Population, 1916, 7,550; in 1921, 7,886.

THE'TIS, in Greek mythology a sea nymph, daughter of Nereus and Doris. By Peleus she became the mother of Achilles.

THIERS, *te air'*, LOUIS ADOLPH (1797-1877), a French historian and statesman and former President of the republic. He was born at Marseilles and was educated for the law, which he forsook for literature and politics. In 1818 he went to Paris and began to write for the *Constitutionnel* and other journals. In 1830 he helped to found the *National*, an organ in opposition to the established government, which did much to bring about the revolution of the same year.

During the reign of Louis Philippe he held various offices, and after the Revolution of

1848 he was elected deputy to the Assembly. He voted for the presidency of Louis Napoleon, but became, later, one of his fiercest opponents, and in 1851 he was arrested and banished. Returning to France in the following year, he went into retirement, but in 1863 he was elected to the Chamber of Deputies. During the crisis of the Franco-German War and the overthrow of the Empire, Thiers came to the front as the strongest man in France. After the fall of Paris he was declared chief of the executive power, and in August, 1871, the Assembly prolonged his tenure of office and changed his title to that of President. His decided views very naturally called forth opposition, and so strong did this become that in 1873 he resigned. From 1876 until the time of his death he was a member of the Chamber of Deputies. Thiers's chief works are *A History of the French Revolution* and a *History of the Consulate and the Empire*.

THIRST, *thurst*, the sensation experienced from a lack of water in the tissues of the body. The sensation is chiefly referred to the throat and mouth, but the condition is really one affecting the entire body. Thirst is a common symptom of fever and of those diseases in which there is a loss of water from the body, as in cholera and diabetes, or when there is a loss of blood. It is also produced by highly seasoned food and by exercise that causes free perspiration. The feeling of thirst may be quenched not only by drinking, but by absorption through the skin by injecting fluids into the veins. Water forms nearly three-fourths the weight of the body and it is essential to the maintenance of life. To maintain the best physical condition one should drink from six to eight glasses of water daily.

THIRTY TYRANTS, the committee of rulers appointed from the aristocratic class at Athens, at the close of the Peloponnesian War. This war was a conflict between democracy, as represented by Athens, and an oligarchical government, as represented by Sparta; and the success of Sparta gave her the power to force upon Athens an oligarchical government. The rule of the Thirty Tyrants was most oppressive, but it lasted for only a year, the old democracy being restored in 403 B. C.

THIRTY YEARS' WAR, a desolating war in Germany, which lasted from 1618 to 1648. It started as a struggle between the Protestant

and the Catholic party, but gradually involved almost all the states of the continent, degenerating at last into a struggle for political power and territory.

The religious question had been by no means settled by the Peace of Augsburg of 1555, and a clash was inevitable. Foreseeing this, the Protestants formed a league for their mutual protection, called the Evangelical Union, and in the following year the Catholics, to offset this, formed the confederation known as the Holy League.

First Phase. The war broke out in Bohemia. A dispute arose between the Protestants and Catholics as to the right of the Protestants to build a certain church, and as the king decided against the Protestants, a body of Protestants, led by Count Thurn, entered the royal palace at Prague on the night of May 23, 1618, and hurled two representatives of the Crown from the windows. They gained control of the government and, declaring Ferdinand II's title to the crown void, made Frederick, the Palatine elector, king of Bohemia. Because Frederick was a Calvinist, many of the Lutherans withheld their support; and when, soon afterwards, Ferdinand II became Holy Roman emperor with greatly increased power, he retaliated by bringing an overwhelming force against the Protestants, and the rebellion was crushed in that quarter. But Ferdinand's harsh treatment of the conquered people and his attitude toward all Protestants stirred the Protestant princes in other parts of Europe, and the trouble spread to Holland and other northern countries and even to England.

Danish Period. In 1625 Christian IV, king of Denmark, supported by England and Holland, came out openly as a champion of German Protestantism. On the side of the Catholics there were at this time two noted commanders, Tilly, the leader of the forces of the Holy League, and Wallenstein, the commander of the Imperial Army. This period of the war proved disastrous to the Protestant allies, and Christian IV in 1629 concluded, with the emperor, the Peace of Lübeck and retired from the struggle. Before this, however, Ferdinand had issued the Edict of Restitution, in accordance with which all property acquired by the Protestant Church since the Peace of Augsburg was returned to the Catholics. This decree was of course obnoxious to the Protestants, and it was clear that it could be enforced only by war.

Swedish Period. The third period of the war, known as the Swedish period, began in 1630, when Gustavus Adolphus, king of Sweden, entered the struggle. He was impelled to take up arms not only because of his devotion to Protestantism, but because Ferdinand's ambitious schemes endangered Sweden. In 1630, with 16,000 men, he started to the relief of Magdeburg, then under siege by Tilly, but it fell before he could reach it, and all the inhabitants were massacred.

To meet the Swedish army which was advancing toward him, Ferdinand recalled Wallenstein, whom, owing to unpopularity in many quarters, the emperor had dismissed. Joined by numerous volunteers and aided by French money, Gustavus Adolphus advanced and routed Tilly in several engagements and finally won a complete victory in the Battle of Lützen, in which he was killed.

The war was then carried on by the Swedish forces under the chancellor Oxenstierna, till the rout of the Swedish forces at Nördlingen (September, 1634) again gave to the emperor the preponderating power in Germany. The elector of Saxony, who had been an ally of Gustavus, now made peace at Prague, and within a few months the treaty was accepted by many of the German princes. The Swedes, however, thought it to their interest to continue the war, while France, which desired to see its old enemy, Austria, crushed, resolved to take a more active part in the conflict. Thus the last stage of the war was a political contest of France and Sweden against Austria.

French-Swedish Period. The struggle continued, and the united armies of the French, under the great generals Turenne and Condé, and of the Swedes, under Torstensson and Wrangel, won a series of victories. But all Europe was sick of war, and in 1645 representatives of the European powers met in two cities in Westphalia and in 1648 the Peace of Westphalia was concluded. The Thirty Years' War left Germany in a state of complete exhaustion. Whole provinces were devastated, and the population was decreased by half.

Related Articles: Consult the following titles for additional information:

Ferdinand II	Reformation
Germany (history)	Richelieu, Cardinal
Gustavus II Adolphus	Tilly, Johann
Lützen, Battles of	Wallenstein
Magdeburg	Westphalia, Peace of

THISTLE, *this'el*, the common name of a widely-distributed group of prickly plants of

the composite family. There are numerous species, most of which are natives of Europe. The leaves are usually coarse and armed with spines, or prickles. Thistles spread by means of seeds and creeping roots. The common *cotton thistle* attains a height of from four to six feet, and is so called because of its covering of white down. It is often regarded as the Scotch thistle, but it is doubtful whether the thistle which constitutes the Scottish national badge has any existing type, though the stemless thistle is in many districts of Scotland looked upon as the true Scotch thistle.

About a dozen species of thistle are common in the United States, spreading from New England to Florida. The *Canada thistle* (which see) is one of the gravest pests of the farmer.

THISTLE, ORDER OF THE, a Scottish order of knighthood, sometimes called the Order of Saint Andrew. It was instituted by James V in 1540 and reorganized by James II of England in 1687. It fell into abeyance during the reign of William and Mary, but was revived by Queen Anne in 1703. The star of the order is of silver, with eight rays, and with a thistle in the center, surrounded by the Latin motto, *Nemo me impune lacessit* (No one injures me with impunity). The ribbon is green. The statute of 1827 limited the number of knights to sixteen members of the Scottish nobility, in addition to the sovereign and princes.

THISTLEBIRD. See AMERICAN GOLDFINCH.

THOMAS, *tom'as*, AUGUSTUS (1859-), a leading American playwright, born in Saint Louis, Mo. Before gaining recognition as a dramatist, he served as special writer on numerous papers and later was editor and proprietor of the *Kansas City Mirror*. Since the production of his initial success, *Alabama*, in 1891, he has devoted himself entirely to dramatic work. In *Mizzoura*, *Arizona*, *The Man Upstairs*, *Mrs. Leffingwell's Boots*, *The Witching Hour*, *As a Man Thinks* and *The Copperhead* are among his most popular plays. Since the death of Charles Frohman, 1915, he has been art director of the Frohman theatrical enterprises.

THOMAS, GEORGE HENRY (1816-1870), a distinguished American soldier who won the title "The Rock of Chickamauga" because his unflinching courage saved the Union army from total defeat at Chickamauga. He was born in Southampton County, Va., and was educated at West Point. He engaged in the

Mexican War, was appointed professor at West Point in 1850, but was recalled to active service in 1855, serving as major in Texas against the Indians. When the Civil War broke out, Thomas was appointed brigadier-general of volunteers in the Federal army. He took part in the Battle of Murfreesboro, and at the bloody Battle of Chickamauga, in September, 1863, saved the Federal army from destruction. He also commanded the Army of the Cumberland at Missionary Ridge, and in 1864 coöperated with Sherman in his march on Atlanta. Returning from Atlanta to Tennessee, he defeated Hood and compelled the Confederates to raise the siege of Nashville, for which he was breveted major-general in the regular army.

THOMAS, THEODORE (1835-1905), a distinguished American orchestra conductor, born at Hanover, Germany. He removed to the United States in 1845 and played in New York for two years, later accompanying Jenny Lind upon her first American tour. He founded an orchestra in 1861, which became famous throughout the world. In 1878 he went to Cincinnati, as director of the College of Music at that city, and for ten years conducted the Brooklyn Philharmonic Society. In 1891 he established in Chicago one of the world's greatest orchestras, supported by popular subscription. In 1904 a magnificent recital hall was built for the orchestra at a cost of \$750,000, but Thomas died soon after, from overwork in connection with its dedication. He presented only the best in music and lived to see his audiences enthusiastically won over to his own high ideals. Frederick Stock (born 1872) succeeded him as director of the Thomas Orchestra, which was later renamed the Chicago Symphony Orchestra.

THOMAS à KEM'PIS (1380-1471), that is, Thomas of Kempe, was born at Kempen, in the archbishopric of Cologne, about 1380. His family name was Hamerken. At the age of twenty he retired to an Augustine convent, near Zwolle, in Holland, where he took the vows. He was a voluminous writer. His works (the printed ones all in Latin) consist of sermons, exhortations, ascetic treatises, hymns and prayers. His name, however, would hardly be remembered, were it not for its connection with the celebrated devotional work called *The Imitation of Christ* (*De Imitatione Christi*). a work which has passed

through thousands of editions in the original Latin and in translations. The authorship of this book is generally ascribed to à Kempis.

THOMPSON, DENMAN (1833-1911), an American actor, known chiefly for his presentation of Joshua Whitcomb, the central figure in *The Old Homestead*. He was born at Beechwood, Pa., but went with his parents to New Hampshire when a child, and there gained the intimate acquaintance with New England character which made his "Josh Whitcomb" famous. He first sketched this character in 1875 and the following year wove a play around it—a play which with minor changes he produced almost until the time of his death.

THOMPSON, JAMES MAURICE (1844-1901), an American writer best known for his admirable romantic novel of the Revolutionary period, *Alice of Old Vincennes*. He was born in Fairfield, Ind., and spent much of his boyhood in Georgia and Kentucky. He fought in the Confederate army and after the war settled in Crawfordsville, Ind., engaging in law practice and civil engineering. Meanwhile, he had begun to write, and subsequently he became editor of *The Independent* (New York). His writings include poems, literary reviews, nature books and a treatise on archery, on which he was an enthusiast. Some of the titles of his books are *Hoosier Mosaics*, *Songs of Fair Weather*, *The Boy's Book of Sport* and *The Ethics of Literary Art*.

THOMSON, tom'son, JAMES (1700-1748), a Scottish poet, born at Ednam, in Scotland, and educated at the University of Edinburgh. He went in 1725 to London, and there wrote his first important group of poems, *The Seasons*. This work was of importance in the history of English literature because it was the first attempt to abandon the old formula and artificial treatment of nature and to express a feeling for its beauties. The poem marked the beginning of the Romantic movement.

In 1740 Thomson composed, in conjunction with Mallet, *The Masque of Alfred*, which contains the famous song, *Rule Britannia*. In 1748 his *Castle of Indolence* appeared, a work which reproduces not only the meter, but to a certain extent the spirit, of Spenser's *Fairie Queene*, and this is, in many respects, Thomson's best work. Thomson was greatly beloved for his amiability and kindness of heart.

THOMSON, WILLIAM. See KELVIN, LORD.

